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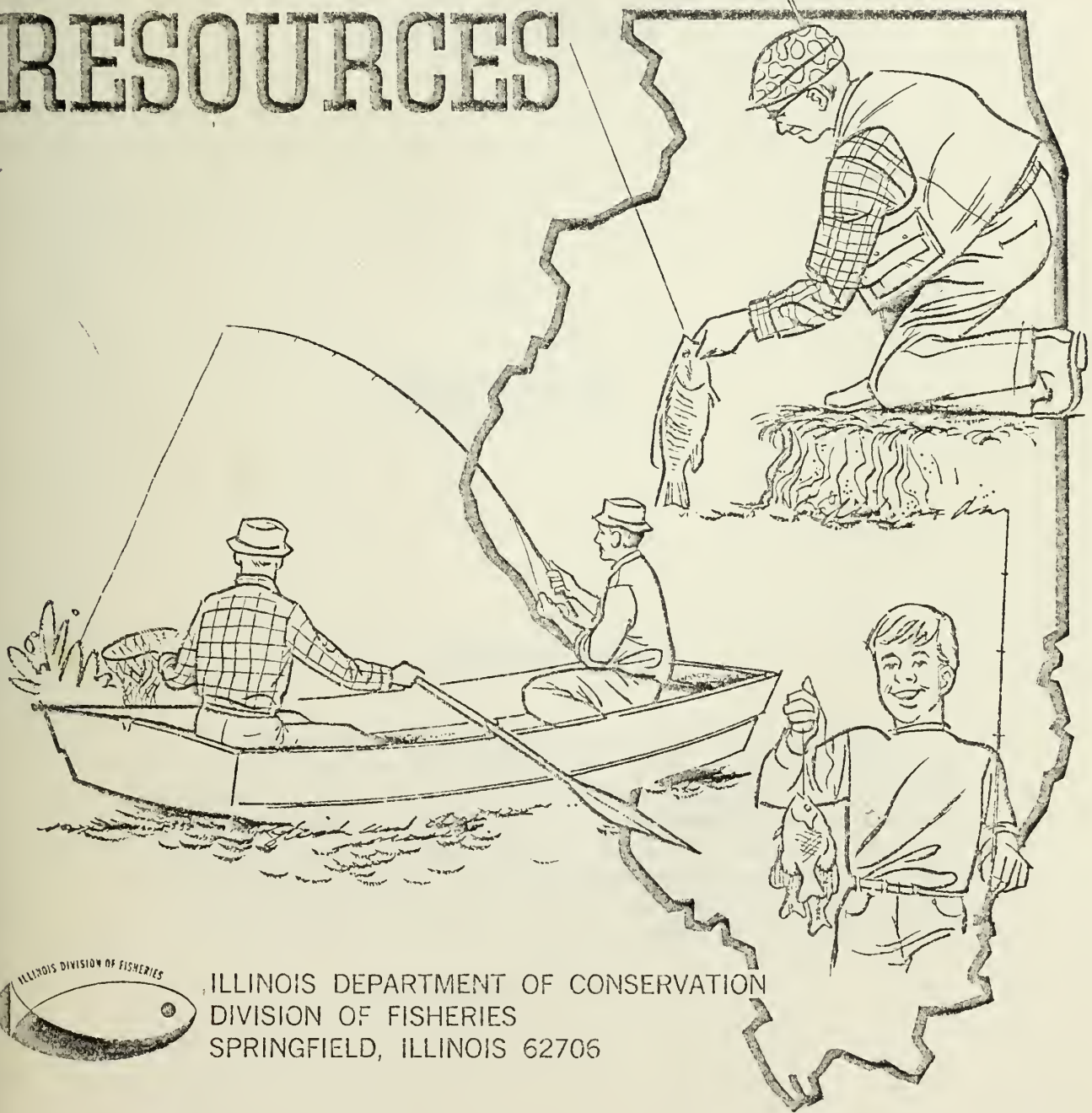
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WABASH COUNTY SURFACE WATER RESOURCES



ILLINOIS DEPARTMENT OF CONSERVATION
DIVISION OF FISHERIES
SPRINGFIELD, ILLINOIS 62706

ACKNOWLEDGEMENTS

Data for this report was obtained from information available in the files of the Department of Conservation, and other county and state agencies associated with conservation. The report was edited by O. M. Price, Area Fishery Biologist and A. C. Lopinot, Chief Fishery Biologist. The original copy of this report was typed by Mrs. Dorothy Basnett, secretary. The final manuscript for printing was typed by Ms. Helen Theivagt, Typist.

July, 1974

ILLINOIS DEPARTMENT OF CONSERVATION

DIVISION OF FISHERIES

WABASH COUNTY

SURFACE WATER RESOURCES

by

RAYMOND E. FISHER
FISHERY BIOLOGIST

December, 1972

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ABSTRACT

Wabash County, 141,440 acres in size, is one of the smallest counties in Illinois and is located on the lower southeastern edge of the state. The city of Mt. Carmel (9,378 population) is the county seat. Presently the estimated population for Wabash County is 13,300 people.

Wabash County is primarily an agricultural county with climate and soils favorable for crops such as corn, soybeans, and wheat. January is the coldest month with an average temperature of 32.7 degrees Fahrenheit and July is the warmest with an average temperature of 79 degrees.

There are currently 449 artificial impoundments comprising a total of 293.49 surface acres of water in the county. Approximately 62 percent of the water acreage is classified as ponds (under 6.0 acres in size). There are three areas which are classified as either "Public" or "Organizational" waters totaling 107.9 surface acres. There are two major streams in the county, Wabash River and Bonpas Creek, which are considered as having a fishing resource. They comprise a total of 4,479 surface acres or 81 stream miles within the county.

Many potential pond but fewer lake sites exist in the county. There are fewer lake sites which will impound over 100 acres of water.

Fishing in the county is limited to the aforementioned lakes, streams, and ponds. The principal sport fishery includes the largemouth bass, bluegill, and channel catfish. Also of interest to the fishermen are commercial species such as carp, bullheads, catfish, and freshwater drum. Fishing is undertaken from early spring through late fall (March to November). The potential of ice fishing exists for a short time in January; however, little ice fishing is undertaken.

For the hunter, the county is noted for small game hunting such as quail, rabbit, and squirrel.

Camping and boating are related to fishing and hunting and are centered around the lakes, streams, and ponds of the county. There are no large waters in the county which will support powerboats and water-skiing.

The future of Wabash County will remain agricultural in nature. There are not sufficient outdoor recreation facilities to meet the current demand and in time, this need may become apparent.

GENERAL SETTING OF THE WATERS IN WABASH COUNTY

Wabash County is located in the lower southeastern section of Illinois (Figure 1). The county is approximately 22 miles long between distant points. The shape of the county is similar to a rectangle cut on a diagonal by the Wabash River. It is over 16 miles wide in the northern extremities and less than one mile in width at the extreme southern point. Wabash County consists of eight townships comprising an area of 214 square miles. Wabash was the thirty-third county formed in Illinois, December 27, 1824, from part of Edwards County. The county was named for the Wabash River (Clayton, 1968).

Agriculture is basic to the financial structure of the county. There are about 115,479 acres in farm lands in the county. A breakdown of land usage is: cropland - 94,561 acres, pastureland - 4,616 acres, woodland - 9,560 acres, and other land, (which includes house lots, roads, cemeteries, oil production land, etc.) 15,974 acres.

Agricultural production during 1964 is estimated to have exceeded \$6,120,241. The major portion was derived from the sale of field crops and livestock. Approximately 82 percent of the county's land is in farms which average 240 acres in size. There are 481 farms in Wabash County.

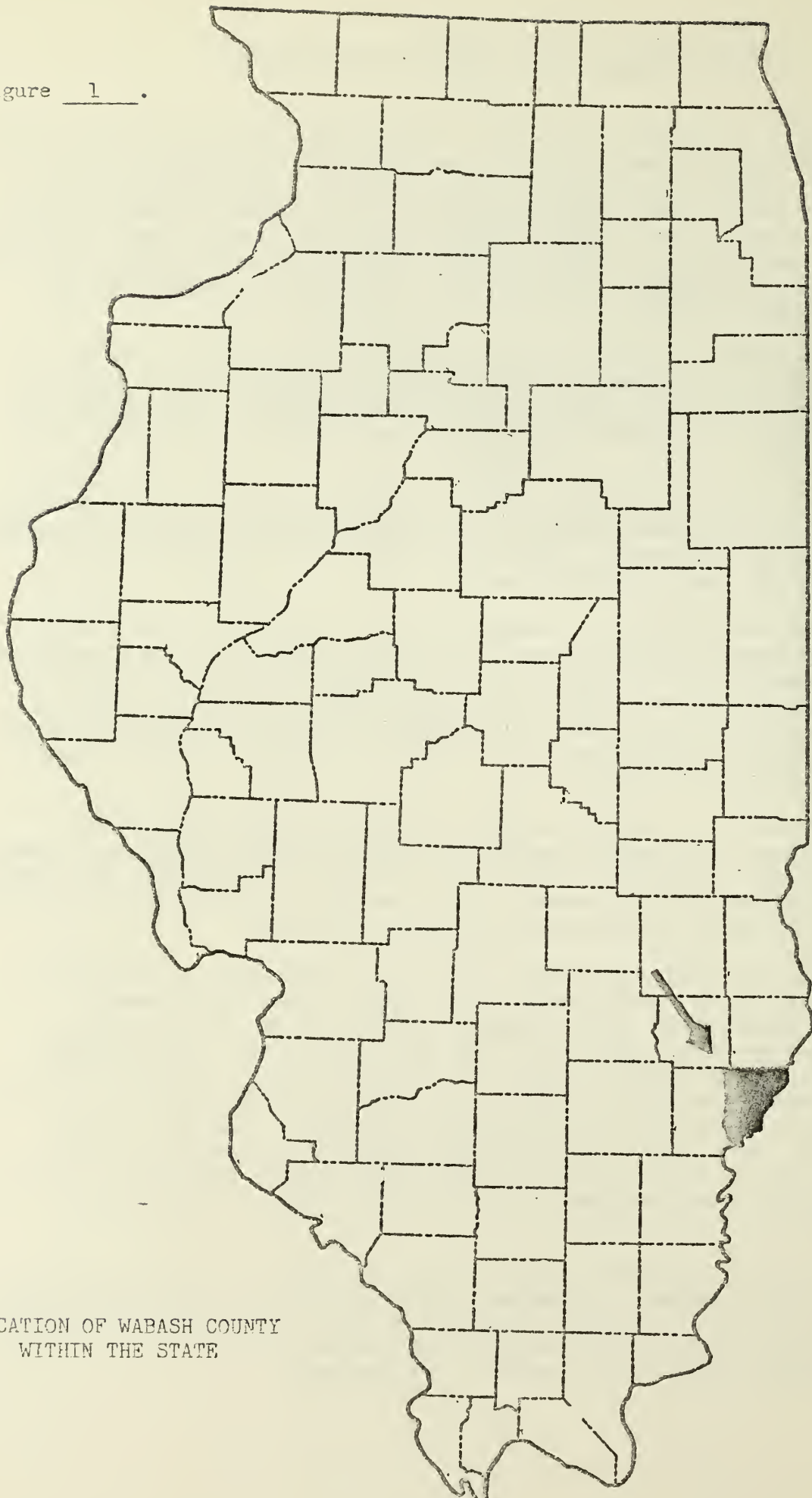
Oil production has played an important role in the economy of the county in past years. The major oil activity was prior to the late 1950's with a peak about 1955. Wabash County showed a fairly large drop in both drilling and production in 1955. Wabash dropped from fifth place in the state in drilling in 1954 to tenth place in 1955 (Bell and Kline). The history of oil has progressed through the secondary recovery era and search for different pay zones, to a reduction of general oil production activity.

Industries located in Wabash County include Snap-on Tools Corporation, located at Mt. Carmel, producing wrenches; Mt. Carmel Garment Company, Mt. Carmel, manufacturing ladies dresses; The Pacific Press and Shear Corporation, Mt. Carmel, manufacturer of hydraulic press brakes, shears, and dies; and Thordarson-Meissner Manufacturies, Mt. Carmel, producing transformers and coils.

Transportation through the county is by Illinois State Route 1 which runs north and south along the eastern edge of the county connecting Allendale, Mt. Carmel, and Grayville in Edwards County. Illinois Route 15 enters from Albion on the western side of the county and joins with Route 1 at Mt. Carmel thence north to St. Francisville. There are 40 miles of paved roads and 324 miles of all weather roads in the county. Mt. Carmel Municipal Airport is located 14 miles northwest of the city. The runway is 4,500 feet long with a black-top surface. Railroad transportation is by the Southern Railway which runs through Albion and Mt. Carmel then out of the county towards Princeton, Indiana. The New York Central runs north and south paralleling Illinois State Route 1 from Grayville to St. Francisville.

Projected data from the 1960 census to the 1967 census, places the county population at 13,300 persons. Mt. Carmel is the county seat, incorporated January 10, 1825. Mt. Carmel is the largest community in Wabash County with a population of 9,378. Other villages in the county with populations ranging between 100 and 500 include Bellmont, Lancaster, Allendale, and Keensburg.

Figure 1 .



LOCATION OF WABASH COUNTY
WITHIN THE STATE

The climate is usually mild with a relatively long growing season. In the summer months, the temperature will range between 65 to 95 degrees Fahrenheit and from 30 to 42 degrees in the winter months. It is seldom hotter than 98 to 100 degrees during the summer or colder than 5 to 6 degrees below zero during the winter months.

PHYSIOGRAPHY

Wabash County is located in the Mt. Vernon Hill Country of the Central Lowland Province. The topography of Wabash is characterized by hilly, rolling, uplands and broad flat floodplains of the Wabash River and Bonpas Creek. Originally the Wabash and Bonpas bottoms were typical floodplain timber; in most areas this has been removed for cropland.

The average land slope in Wabash County is 2.71 percent - a vertical change of 2.71 feet in each 100 feet of distance. There are no particularly high bluffs in the county. The general elevation of the county is highest toward the northern extremities of the county; almost 490 feet above mean sea level. The minimum elevation is found at the south portion of the county where it is near 400 feet above mean sea level. The general elevation is about 440 feet above mean sea level.

CLIMATE

Wabash County has a continental climate, typical of Illinois, which means hot summers and cool winters (Page, 1949). The average January temperature is 32.7 degrees and the average July temperature is 79 degrees. The average annual temperature is 56.5 degrees (Figure 2). Climate data is not specific for record days; however, the all time high for this area was recorded at Mt. Carmel during July, 1953, when the temperature reached 112 degrees. The lowest temperature recorded at Mt. Carmel was during February, 1952, when it reached 15 degrees below zero.

Winds of Wabash County are commonly from the southwest during the summer and northwest during the winter (Page, 1949). A change in wind direction usually affects the temperature and moisture conditions of the air.

The mean annual rainfall at Mt. Carmel is 43.62 inches. Approximately 60 percent of the rainfall occurs during the warmer half of the year (Figure 3). April is the month having the most precipitation (4.68 inches) and August has the least (2.06 inches). Moisture, in the form of snow, is accumulated annually from 14 to 16 inches. Snowfall may occur any time from October through April.

The average growing season is 190-200 days in length. The average date of the last killing frost in the spring is April 13 and the average date of the first killing frost in the fall is October 13. Figure 3 presents the average monthly rainfall and Figure 4 the average monthly snowfall for Wabash County. Figure 5 presents the long term mean annual precipitation for stations in and near Wabash County.

WABASH COUNTY, MT. CARMEL
(7 yr. period)

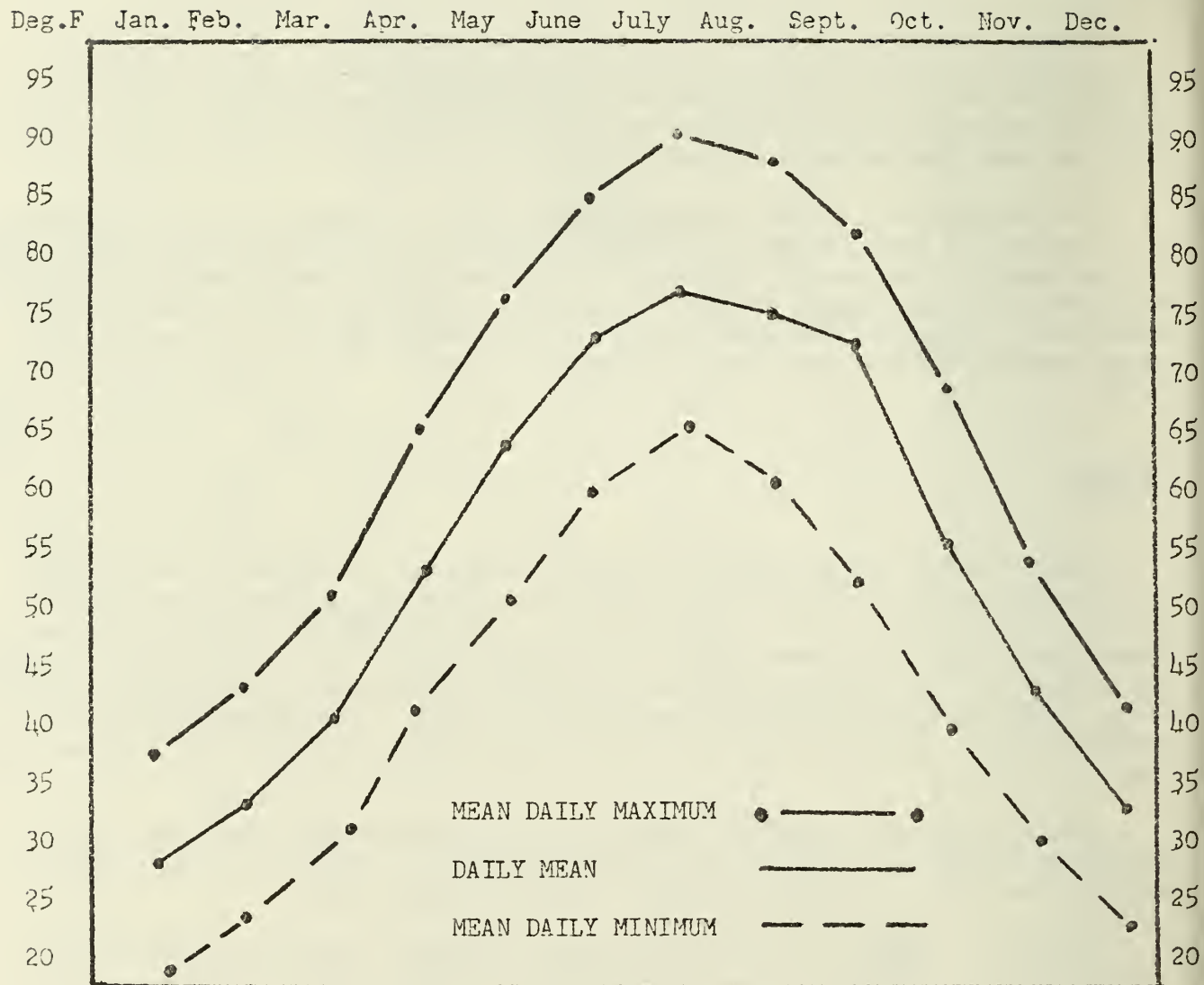


Figure 2

Source of data: CLIMATOGRAPHY OF THE UNITED STATES NO. 86-9 U. S. DEPARTMENT OF COMMERCE.

In. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. In.

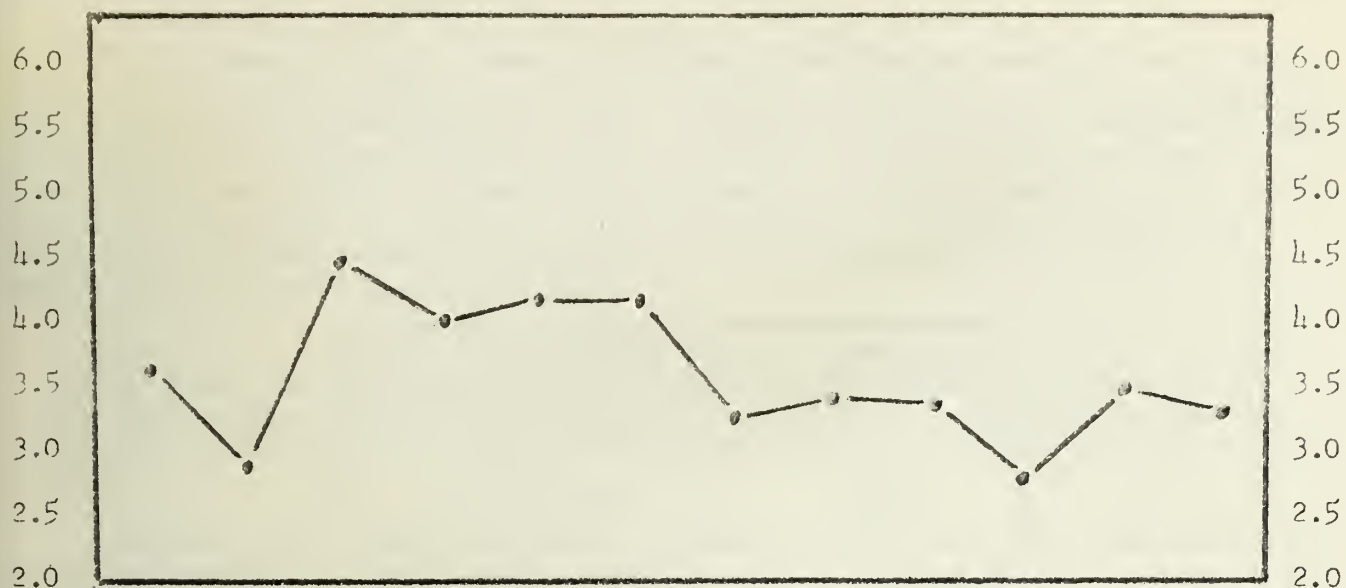


Figure 3. TOTAL AVERAGE PRECIPITATION, MT. CARMEL (10 year average)

In. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. In.

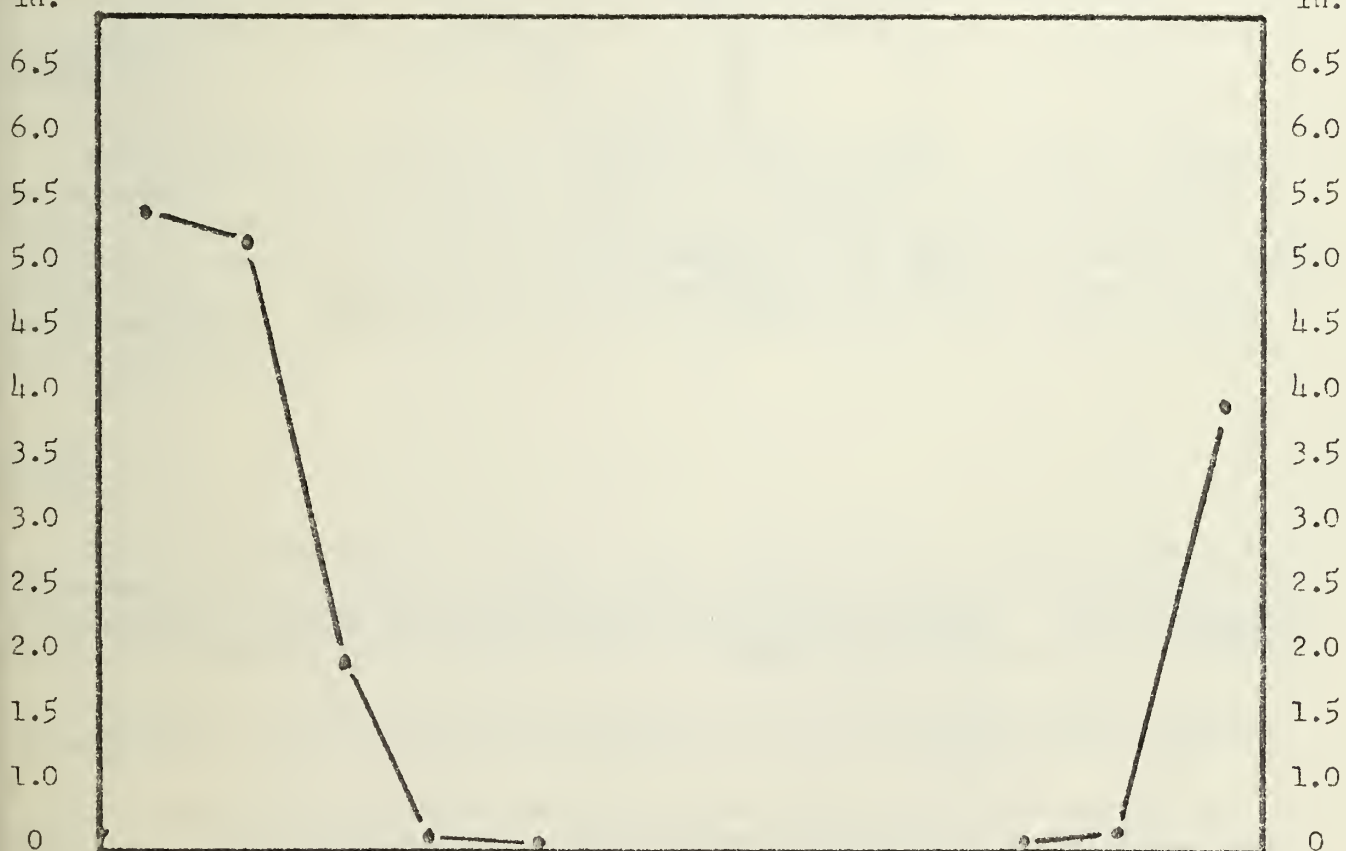


Figure 4. AVERAGE SNOWFALL, MT. CARMEL (10 year average)

Source of Data: CLIMATOGRAPHY OF THE UNITED STATES NO. 86-9 U.S. Dept. OF COMMERCE.

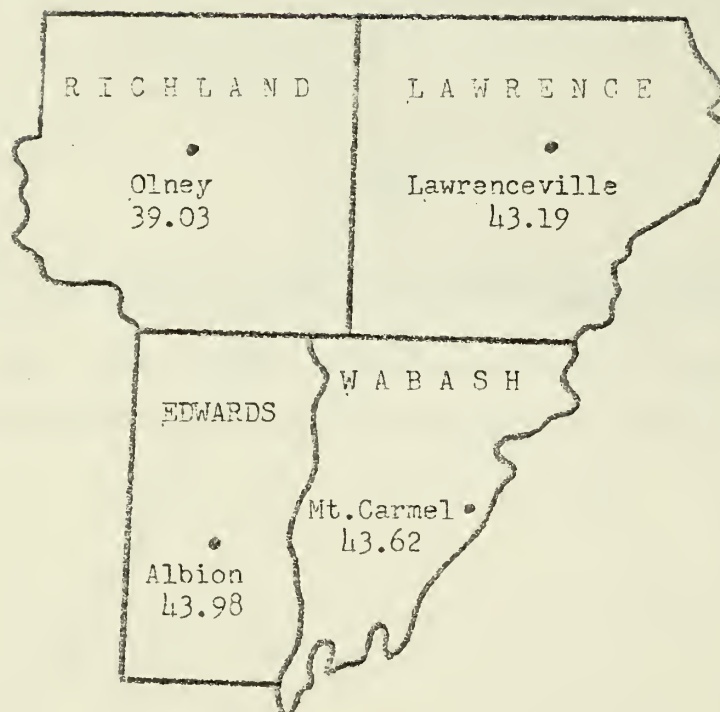


Figure 5 LONG-TERM MEAN ANNUAL PRECIPITATION FOR STATIONS IN AND NEAR WABASH COUNTY.

Source of Data: CLIMATOGRAPHY OF THE UNITED STATES NO. 86-9 U. S. WEATHER BUREAU.

GEOLOGY

The bedrocks, at the surface or underneath the glacial material, and loess consists of layers of shale, sandstone, limestone, dolomite, and chert arranged one upon the other like pages of a book. Although solid rock now, originally they were deposited as loose sediments and precipitates in the shallow seas that covered the continents. The burial and compaction hardened them into solid rock during the hundreds of millions of years following. The layers of rock were later warped or broken so that today they are not horizontal as they were when deposited as sediment on a sea floor.

These rocks have been bent into the form of a bowl shaped basin in southern Illinois called the Illinois Basin. The central and deepest part of the basin is located in White County where the same rock formation exposed at the surface along the Mississippi River north of Cario lies several thousand feet below the surface.

Reserves of No. 5 coal estimated for Wabash County totals 761,302,000 tons (Hopkins, 1968). The dip in the county is to the west, and the coal varies from slightly lower than 100 feet below mean sea level in the northeastern part of the county along the Wabash River to 400 to 500 feet below sea level along the western boundary.

DRAINAGE

Wabash County is located in the Wabash River Watershed. A major tributary to the river is Bonpas Creek, the common boundary between Wabash and Edwards County. Bonpas Creek drains approximately the western one-half of Wabash County (Figure 6). Named tributaries to Bonpas Creek include Fordice, Jordan, and Little Bonpas Creek. On the eastern side of Wabash County the major stream drain into the Wabash River. The prominent named streams include Coffee, Sugar, Raccoon, and Crawfish creeks.

SOILS

Most of Wabash County's parent soil is formed by loess varying from 25 to 50 inches on the uplands to a narrow band existing in the eastern portion of the county, where loess accumulated up to 100 inches in thickness. Alluvial material of Wisconsin Age is present along both the Wabash and the Bonpas Creek drainage.

The soils of Wabash County are classified into six land resource areas (Figure 7):

1. Wakeland-Petrolia-Darwin Association. Bottomland soils subject to flooding. Wetness or drouthiness are problems in some parts of the area. The soils are deep, light to dark colored and low to high in natural productivity.

2. Carmi-Sumner-Patton Association. Terrace and upland soils subject to wetness on some level areas, drouthiness and wind erosion on sandy areas, and slight to severe water erosion on gentle to moderate slopes. The soils are deep, light to dark colored and low to high in natural productivity.

WATERSHED MAP

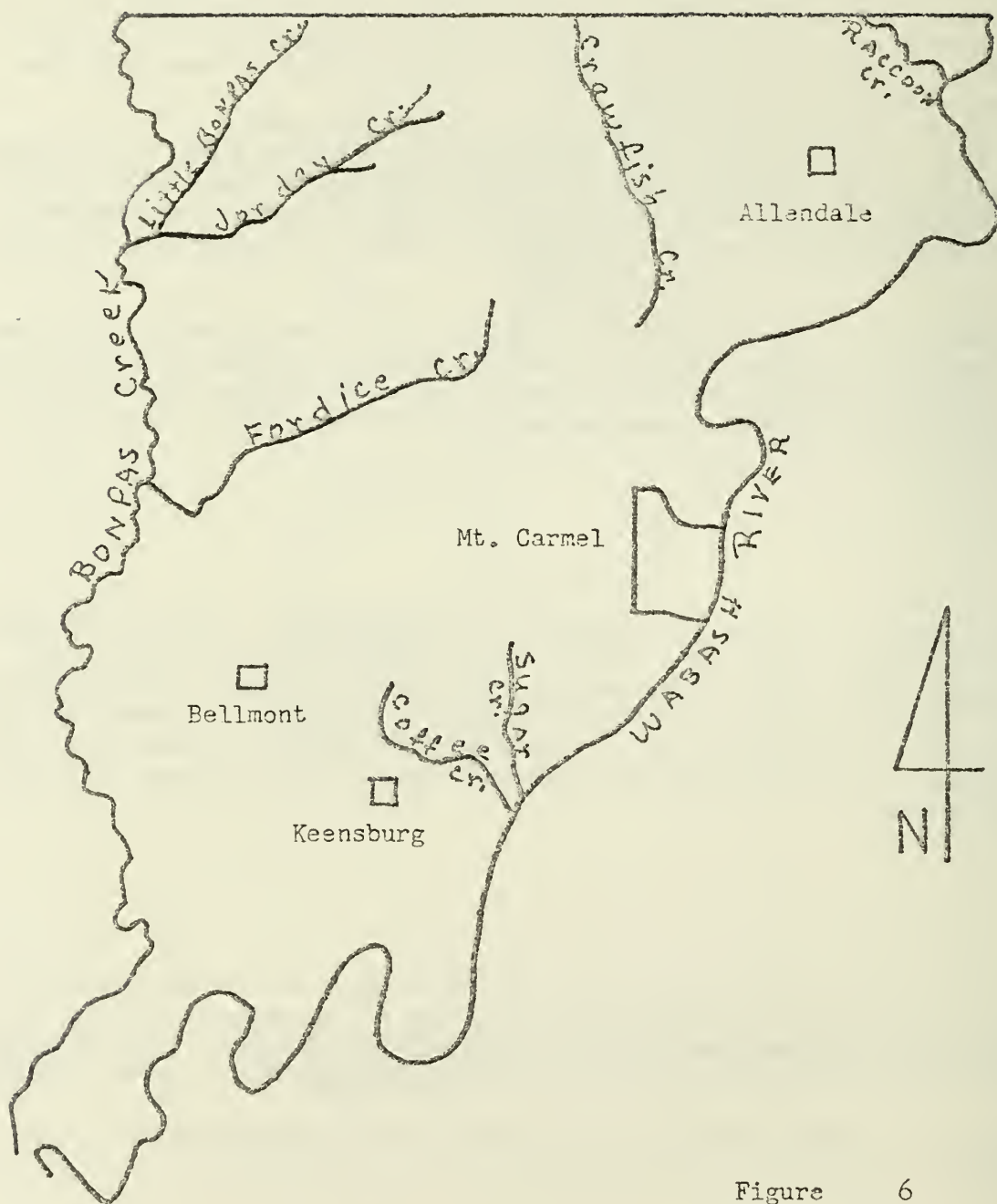


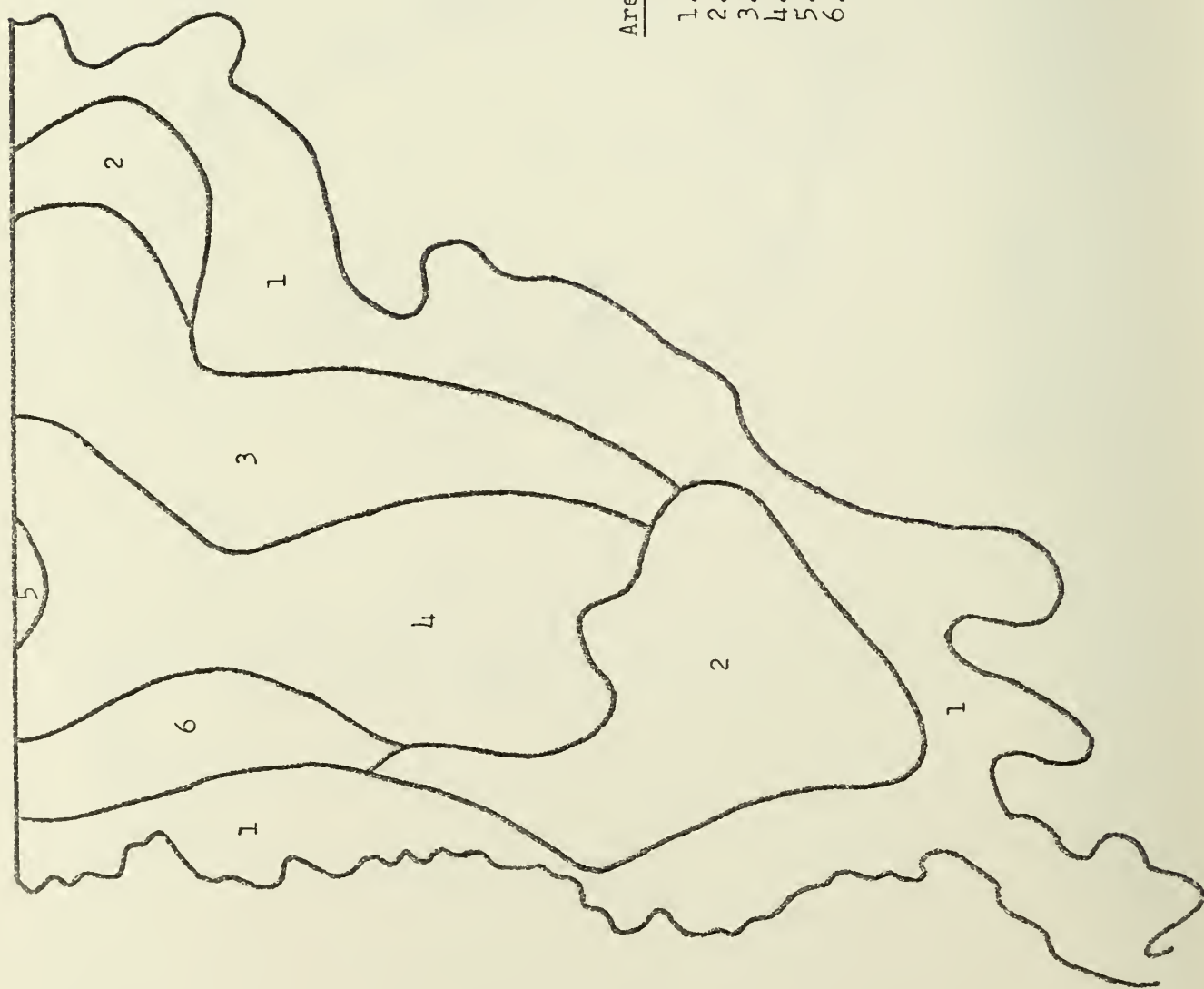
Figure 6

3. Alford-Hickory Association. Upland soils subject to slight to severe erosion on gentle to steep slopes. The soils are deep, light colored, and medium to high in natural productivity.

4. Stay-Bluford-Blair Association. Upland soils on gentle to strong slopes subject to slight to severe erosion but with some level areas subject to wetness. The soils are deep to moderately deep, light colored and low to medium in natural productivity.

5. Cowden-Cisne Association. Upland soils subject to wetness on level areas and containing some gentle slopes subject to slight to moderate erosion. The soils are deep, light to moderately dark colored and low to medium in natural productivity.

6. Miami-Strawn-Camden Association. Upland soils subject to moderate to severe erosion on moderate to steep slopes. The soils are deep, light colored and low to medium in natural productivity.



SOILS ASSOCIATION MAP

Area

Legend

- | | |
|----|---------------------------------|
| 1. | Wakeland-Petrolia-Darwin Assoc. |
| 2. | Carmi-Sumner-Patton Assoc. |
| 3. | Alford-Hickory Assoc. |
| 4. | Stoy-Bluford-Blair Assoc. |
| 5. | Cowden-Cisne Assoc. |
| 6. | Miami-Strawn Assoc. |

Figure 7

ALPHABETICAL LISTING AND DESCRIPTION OF MAJOR LAKES AND STREAMS

Lakes

All of the lakes in Wabash County have been surveyed and descriptions are provided. Descriptions follow under an alphabetical listing of the lakes. Factual data includes location, size, length of shoreline, maximum depth, ownership, lake origin, and year impounded. Further descriptions are made as to fertility, fisheries resources, and problems associated with use. In addition to descriptive data, additional data is included in Table 1.

In considering the lakes of Wabash County, it is necessary to first establish a definition relative to size. For this discussion, all water areas over 5.9 acres are classed as lakes. Water areas 5.9 acres and less are referred to as ponds.

This discussion will consider only public and organizational lakes and ponds.

Three private lakes exist in the county. Permission from the owner must be obtained for recreational privileges.

Organizational or club waters are open to members and guests. Memberships are usually available to interested fishermen or other recreationists.

Mt. Carmel City Golf Course Pond: T1S, R12W, Section 18; Public; Surface Acres = 1.0; Maximum Depth = 6.5 feet; Shoreline Length = .18 mile; Constructed = 1937.

This small artificial impoundment is located on the west edge of Mt. Carmel, and is used primarily for recreation. Surrounding topography is rolling, with much of the watershed in golf course property. The dam was rebuilt in 1960 and stocked with fish by various individuals. Species now present include black bullheads, crappie, bluegill, and largemouth bass. Filamentous algae has been a large problem, sometimes nearly covering the pond. A past problem was that of salt water from an oil well which once polluted the pond.

Mesa Lake: T1N, R13W, Section 9; Organizational; Surface Acres = 101.8; Maximum Depth = 26 feet; Shoreline Length = 3 miles; Constructed = 1961.

Located one mile south of Lancaster, this large lake is used for recreation and has a surrounding area of rolling woodland. Included in the watershed is a small lake of 6.9 acres located above the larger lake, which is used as a siltation pond and fishing. Species of fish found in both lakes are largemouth bass, bluegill, green sunfish, and warmouth. Southern naiad has been a problem in the lake and in July, 1967, this aquatic weed was brought under control by an experimental chemical (formula 292) from Pennsalt Chemical Corporation. Fine leaf pondweed has also appeared in the lake but has not been a problem.

TABLE 1

PUBLIC AND ORGANIZATIONAL WATERS OF WABASH COUNTY

Name of Lake	T.	Description R. Sec.	Year Const.	Surface Acres	Maximum Depth (feet)	Shoreline Length (miles)	Watershed Size (acres)	Primary Usage
Mt. Carmel City Golf Course Pond	1S	12W 18	1937	1.0	6.5	.18	30	Recreation
Mesa Lake	1N	13W 9	1961	101.8	26.0	3.00	100	Recreation
Wabash County Conservation Club	1S	13W 14	1948	5.1	15.0	.44	55	Recreation

Wabash County Conservation Club: T1S, R13W, Section 14; Organizational; Surface Acres = 5.1; Maximum Depth = 15.0 feet; Shoreline Length = .44 mile; Constructed = 1948.

The Wabash Conservation Club Lake is located 3.5 miles north west of Mt. Carmel. The lake is used for fishing and recreation by the 300 club members. The lake is located on scenic rolling farm and timber land; much of the upper end of the lake is in pine trees giving the lake a pleasing appearance. Physical features of the lake include a long earth dam giving the lake a rectangular shape with one prominent point dividing the lake into two prominent necks. Species of fish found in the lake include largemouth bass, bluegill, warmouth, and channel catfish. Over population of the smaller sunfishes, filamentous algae, cattails and underwater weeds have all contributed to the fish management problems in the past. Currently the lake is utilized more than many organizational lakes.

Streams

For this discussion only, major game and commercial species will be considered (Table 2). Many other species of fish do exist in Wabash County and are tabulated in Table 3. The list is incomplete and will increase as new species are discovered.

All stream descriptions are by name and location of stream effluence or where it leaves the county (Table 4).

Bonpas Creek: T3S, R14W, Section 21; Surface Acres = 96; Miles = 32; Average Width = 25 feet; Gradient = 1.0 foot per mile; Tributary to Wabash River.

Bonpas Creek (Bonpas or Bon Pas Creek) was probably the first named place in Wabash County. French traders and trappers, in the early 1700's after facing hostile Indians and other wilderness elements, made their last camp at the mouth of this creek as they returned to the trading post at Vincennes, Indiana. The Indians were friendly and the trip almost complete, thus the stream was given the name "Bonpas" meaning "Fair or Good Passage".

As a common boundary between Wabash and Edwards counties, the stream served the early pioneers with a means to ship farm produce. Wooden flatboats, up to 80 feet in length constructed at local sawmills, made trips downstream stopping at various docks to pick up farm products.

Bonpas Creek originates approximately four miles east of Olney in Richland County. From the source, it flows about 45 miles south to enter the Wabash River near Grayville. Bonpas drains a flat, narrow basin of 258 square miles - 149 square miles in Wabash County. The stream is slow flowing with a mud bottom. The stream is usually silt laden due to agricultural activity in the watershed. Average depth is three feet, varying from 13 feet in a pool to one foot riffles. During an inspection in July, 1962, secchi disc turbidity was recorded as 4.0 inches. Except for the immediate area along the banks which support various tree and shrub species, much of the original timber has been removed from the creek bottom and the land converted to cropland. In areas where grazing occurs, livestock is usually permitted access to the stream.

TABLE 2

A CATEGORICAL LISTING OF FISHES OCCURRING IN ILLINOISGame

Rainbow Trout	Yellow Bass	Spotted Sunfish
Brown Trout	Rock Bass	Smallmouth Bass
Grass Pickerel	Flier	Largemouth Bass
Northern Pike	Warmouth	White Crappie
Black Bullhead	Green Sunfish	Black Crappie
Yellow Bullhead	Pumpkinseed Sunfish	Yellow Perch
Brown Bullhead	Orangespotted Sunfish	Sauger
Channel Catfish	Bluegill	Walleye
Flathead Catfish	Longear Sunfish	Freshwater Drum
White Bass	Redear Sunfish	Hybrid Sunfish

Commercial

Shovelnose Sturgeon	Goldeye	Bigmouth Buffalo
Longnose Gar	Mooneye	Black Buffalo
Spotted Gar	Carp sucker sp.	Smallmouth Buffalo
Shortnose Gar	White Sucker	Spotted Sucker
Bowfin	Hog Sucker	Carp
	Redhorse	Eel

Forage

Brook Lamprey	Gambusia	Redfin Shiner
Gizzard Shad	Logperch	Common Shiner
Stonecat	Creek Chub	Emerald Shiner
Madtom sp.	Stoneroller	Brook Silverside
Johnny Darter	Hornyhead Chub	Silverjaw Minnow
Bluntnose Darter	Bluntnose Minnow	Spotfin Shiner
Slenderhead Darter	Suckermouth Minnow	Ghost Shiner
Fantail Darter	Fathead Minnow	Mimic Shiner
Rainbow Darter	Redbelly Dace	Bullhead Minnow
Blackside Darter	Roseyface Shiner	Golden Shiner
Banded Darter	Sand Shiner	Blacknose Shiner
Orangethroat Darter	Steelcolor Shiner	Redfin Shiner
River Darter	Blackstripe Topminnow	Sculpin sp.
Ironcolor Shiner	Red Shiner	Swamp Darter
Weed Shiner	Pirate Perch	Central Mudminnow
Pugnose Minnow	Mud Darter	Brook Stickleback
Blackspotted Topminnow	Bigeye Shiner	

SOURCE OF DATA: Department of Conservation, Division of Fisheries, Manual of Operations.

TABLE 3

FISHES OCCURRING IN WABASH COUNTY

LEPISOSTEIDAE (gar family)

Longnose gar - *Lepisosteus osseus* (Linnaeus)

Shortnose gar - *Lepisosteus platostomus* Rafinesque

AMIIDAE (bowfin family)

Bowfin - *Amia calva* Linnaeus

HIODONTIDAE (mooneye family)

Mooneye - *Hiodon tergisus* Le Sueur

CLUPEIDAE (herring family)

Gizzard shad - *Dorosoma cepedianum* (Le Sueur)

ESOCIDAE (pike family)

Grass pickerel - *Essox americanus* (Le Sueur)

CATOSTOMIDAE (sucker family)

Carpsuckers - *Carpiodes* sp.

White sucker - *Catostomus commersoni* (Lacepede)

Blue sucker - *Cycleptus elongatus* (Le Sueur)

Smallmouth buffalo - *Ictiobus bubalus* (Rafinesque)

Bigmouth buffalo - *Ictiobus cyprinellus* (Valenciennes)

Spotted sucker - *Minytrema melanops* (Rafinesque)

Golden redhorse - *Moxostoma erythrurum* (Rafinesque)

CYPRINIDAE (minnow family)

Carp - *Cyprinus carpio* Linnaeus

Silverjaw minnow - *Ericymba buccata* Cope

Silvery minnow - *Hybognathus nuchalis*

Golden shiner - *Notemigonus crysoleucas* (Mitchill) *

Redfin shiner - *Notropis umbratilis* (Girard)

Suckermouth minnow - *Phenacobius mirabilis* (Girard)

Bluntnose minnow - *Pimephales notatus* (Rafinesque)

ICTALURIDAE (catfish family)

Black bullhead - *Ictalurus melas* (Rafinesque)

Yellow bullhead - *Ictalurus natalis* (Le Sueur)

Channel catfish - *Ictalurus punctatus* (Rafinesque)

Flathead catfish - *Pylodictis olivaris* (Rafinesque)

CYPRINODONTIDAE (topminnow family)

Blackstripe topminnow - *Fundulus notatus* (Rafinesque)

POECILIIDAE (livebearer family)

Common gambusia - *Gambusia affinis* (Baird and Girard)

APHREDODERIDAE (pirateperch family)

Pirateperch - *Aphredoderus sayanus* (Gilliams)

CENTRARCHIDAE (sunfish family)

Warmouth - *Chaenobryttus gulosus* (Cuvier)
Green sunfish - *Lepomis cyanellus* (Rafinesque)
Bluegill sunfish - *Lepomis macrochirus* (Rafinesque)
Longear sunfish - *Lepomis megalotis* (Cope)
Redear sunfish - *Lepomis microlophus* (Gunther)
Spotted bass - *Micropterus punctudatus* (Rafinesque)
Largemouth bass - *Micropterus salmoides* (Lacepede)
White crappie - *Pomoxis annularis* (Rafinesque)
Black crappie - *Pomoxis nigromaculatus* (Le Sueur)

PERCIDAE (perch family)

Bluntnose darter - *Etheostoma chlorosomum* (Hay)
Swamp darter - *Etheostoma gracile* (Girard)
Blackside darter - *Percina maculata* (Girard)

SCIAENIDAE (drum family)

Freshwater drum - *Aplodinotus grunniens* (Rafinesque)

SOURCE OF DATA: Inventory of the Fishes of the Little Wabash River Basin, 1962;
Illinois Department of Conservation, pages 28 - 37.

TABLE 4
STREAMS OF WABASH COUNTY

Name Of Stream	Legal Description	Surface Acres	Miles In Co.	Width In Ft.	Inter-mittent	Percent Dredged
Bonpas Creek	T3S R14W S21	98.4	32.5	25	-	-
Crawfish Creek	T2N R12W S31	11.5	9.5	10	X	30
Little Bonpas Creek	T2N R13W S32	7.3	6.0	10	-	-
Jordan Creek	T1N R13W S11	8.4	7.0	10	X	-
Fordice Creek	T1S R14W S11	11.5	9.5	10	X	35
Raccoon Creek	T1N R11W S 5	6.1	2.5	20	-	-
Coffee Creek	T2S R13W S11	6.0	5.0	10	-	20
Wabash River	T3S R14W S21	4,383.0	49.0	738	-	-
Sugar Creek	T1S R12W S35	3.6	3.0	10	X	-
Unnamed Creek	T2N R13W S35	4.9	4.0	10	X	25
Drainage	T2S R14W S29	3.6	3.0	10	-	95
Unnamed Creek	T2S R14W S26	6.6	5.5	10	X	20
Unnamed Creek	T2S R13W S 7	4.2	3.5	10	-	70
Unnamed Creek	T1S R13W S12	8.4	7.0	10	X	60
Unnamed Creek	T1S R14W S34	6.0	5.0	10	X	25
Unnamed Creek	T1N R13W S14	5.4	4.5	10	X	40
Unnamed Drainage	T1S R13W S10	3.6	3.0	10	X	-
Unnamed Creek	T2N R12W S34	7.3	6.0	10	-	50
Drainage	T1S R14W S28	3.0	2.5	10	-	100
Unnamed Creek	T1S R14W S15	3.6	3.0	10	X	35
Unnamed Creek	T1S R13W S23	4.9	4.0	10	X	50
Unnamed Creek	T1N R14W S31	4.9	4.0	10	X	55

Bonpas Creek supplies fishing of a very limited degree. Fishermen visiting the stream are primarily children who live in the locality. The data collected in a 1962 inventory of the fish population suggests that sport fishing would be poor because the fish population consists primarily of commercial species such as carp, freshwater drum, smallmouth buffalo, bowfin, and spotted sucker. Of the fishes sampled, none were of a size adequate to interest commercial fishermen. Game fishes collected at the same time included bluegill, green sunfish, black bullhead, yellow bullhead, and white crappie. This group of fishes were of a small size and would be of little interest to local fishermen. Oil pollution has been noted as quite heavy in some areas.

Wabash River: T3S, R14W, Section 21; Surface Acres = 4,383; Miles = 49; Average Width = 738 feet; Gradient = 0.64 foot per mile; Tributary to Ohio River.

Early French explores named the Wabash or "Oubache". They applied the name not only to the stream, but to the area of the Ohio where the Wabash joins down to its confluence with the Mississippi. "Marquette in 1673, on his voyage of discovery down the Mississippi, records passing the mouth of the Oubache in little less than forty leagues below the confluence of the Mississippi and Missouri" (Annon. 1875).

The Wabash served as one of the first routes by which the early French settled Illinois. This involved a portage, about nine miles, dividing the Maumee from the Wabash and then down the Wabash to the Mississippi. This route was secured by establishing a military post at Vincennes, the first permanent settlement in the Wabash Valley, and the state of Indiana, sometime between 1712 and 1735.

The Wabash River is one of the largest tributaries of the Ohio River originating about 15 miles east of the Indiana-Ohio state line. The Wabash flows in a northwesterly direction to the vicinity of Huntington, Indiana, then turns southwesterly until it joins the Ohio a few miles north of Shawneetown, Illinois. The Wabash and its major tributaries (the Salamonie, the Mississinewa, the White, the Embarras, the Little Wabash, and the Patoka rivers) drain an area of 33,100 square miles. The Wabash River drainage area includes about 2/3 of Indiana, 1/6 of Illinois and about 319 square miles of Ohio in its 475 miles of length. The river serves as the common boundary between Illinois and Indiana for approximately 200 miles. The 1/6 of Illinois drainage area consists of 8,800 square miles of the southeastern part of Illinois.

The topography in the Wabash River basin varies considerably from one area to the next. In the upper portion, the land has a shallow rolling characteristic. Toward the south, it tends to be more broken as it approaches its confluence with the Ohio River.

The Wabash River and most of its tributaries flows through flat, farming type agricultural country. Most of the stream beds in this basin do not have a fall that will exceed one foot per mile. Through the Grand Prairie Region, the river banks are typically vertical silt banks. In the lower reaches, the river bottom is sand, gravel and rock with pools and riffles. In some areas, depths of the river are reported up to 40 feet although 25 feet will probably be the maximum depth of most of the deeper holes. The average depth of the river is about 10 feet.

Major usage of the river includes swimming, skiing, boating, commercial and sport fishing. Major use areas are: Mt. Carmel Boat Club at the edge of Mt. Carmel (fee \$1.00), Allendale Boat Club one mile north and one mile east of Allendale, and an unnamed area at the east edge of Rochester, Illinois.

The fish population of the Wabash River bordering Illinois was sampled by electro fishing at 18 stations during August, 1967. Sport fishing is primarily bait fishing for channel catfish and carp. A total of 45 species of fish were collected by electro fishing and seine hauls. There were 3,006 fish weighing 2,501 pounds sampled by the electro fishing method. Minnow seine hauls collected 1,050 miscellaneous minnows. Game fish were collected on an average of 0.6 fish per minute of sampling. Spotted bass represented 44 percent of the total number of game fish collected and 28 percent of the total game fish poundage. Commercial fish were collected at a rate of 0.7 fish per minute of sampling. Carp composed 57 percent of the total number of commercial fish collected and 93 percent of the total weight. Forage fish were collected at a rate of 2.1 fish per minute of sampling and consisted primarily of gizzard shad; by number 99 percent and weight 98 percent. Over all 18 stations, forage fish represented 62.4 percent of the total number of fish collected, commercial fish 20.7 percent and game fish 16.9 percent. By weight, commercial fish represent 66.5 percent of the total, forage fish 25.4 percent and game fish 8.1 percent (Price, 1967).

Marketing and low price paid for fish has caused the number of commercial fishermen earning a living, totally or in part, to drop from 41 during 1953 to 19 fishermen reporting their catch on the Wabash in 1969. Over the past 17 years (1953-1969), their average poundage catch for the various commercial species of fish is as follows: carp - 32,372, buffalo - 16,985, drum - 3,995, catfish - 13,382, bullheads - 7, sturgeon - 2,365, paddlefish - 312, white carp - 7,219, suckers - 1,319, gar - 553, bowfin - 31, and eel - 55.

Another fisheries product often forgotten is the freshwater mussel. During the early 1900's, mussel shells were used to make pearl buttons and several fishermen on the Wabash River made a living by fishing for the various species of mussel. The more valuable button mussel shells included the yellow sand shell, three ridge, maple leaf, nigger head, pig toe, monkey face, pimple back, butter fly, and a few more thick shelled species.

After the Second World War, the pearl button was replaced almost totally by plastics and the mussel fishing declined. The harvest of mussels was not significant until the mid 1960's, when Kokichi Mikimoto of Japan developed a use for them in the cultured pearl industry. He discovered the mussel shell, when cut and ground into round spheres, worked best as an implant in the ocean oyster. The oyster would secrete a mother of pearl layer around the sphere thus reducing the growing time of the cultured pearl by some years.

Prior to 1964, most of the mussel fishing was done in the Tennessee Valley River system; however, as the supply dwindled, the buyers moved their operations further north. The year 1965, was the major harvest on the three major rivers in Illinois. During 1965, the Wabash produced the most commercially valuable mussel shells; (Wabash River 919 tons - value \$240,000, Illinois River 1,159 tons - value \$75,335, and the Mississippi River 181 tons - value \$11,765). The primary mussel species sold included; maple leaf mix - 50 percent, three ridge - 35 percent, washboard - 6 percent, buckhorn - 4 percent, miscellaneous - 5 percent. The maple leaf mixed group included such species as maple leaf, pig toe, pimple back, monkey face, hickory nut, nigger head, warty back, and butter fly. The miscellaneous group included mussel species such as mucket, bullhead, and three horned warty back (Lopinot, 1967).

Since 1967, the mussel fishing has fallen off drastically due to overfishing on the very slow growing mussels. In time, should the pearl industry recover from a slump and require more shells, it may become necessary to close sections of the river to permit continued reproduction and growth. Gravel dredging operations at several locations along the river destroy much of the mussel habitat and should be curtailed.

Pollution within the basin is basically agricultural, industrial, and domestic. In the area sampled during a 1967 survey, pollution was present as implied by municipal waste discharges and various industrial discharges. During the periods of low flow summer months, people sometimes complain about a "bad taste" in fish. Past investigations have associated the taste with algae blooms of large proportions. Speculation is that blooms are associated with organic pollutants and use of farm fertilizers within the watershed.

The greatest danger to the highly desirable natural area, particularly the lower portion of this stream, is not from pollution which in time can be corrected. Channelization is the one thing man can do to destroy the natural beauty of this river for generations to come.

SUMMARY OF INVENTORY DATA

Information gathered from past field work or other sources and of importance to this report has been summarized, in order to form a more concise picture of the water resources in Wabash County. All of the data presented may be found in Table, Figure or Chart form associated with the appropriate interest.

POPULATION AND AREA

The population of Wabash County has slowly declined from a high of approximately 14,913 during the early 1910's to 14,047 people as of the 1960 U.S. Census (Figure 8). An oil boom during the 1940's and 1950's helped maintain the population which began to diminish in the late 1950's as oil work stabilized. The primary reason for the decline in county population is related to a change in farming practices. From the small general farms producing both crop and livestock products, more specialized operations producing in one area are now prevailing. Currently many small farmers are selling their farms, which are being incorporated into large specialized farms.

In 1959, there were 600 farms in Wabash County - in 1964, there were 481 farms. This reduction of 119 farms during the five year period increased the average size of the farm from 205.9 to 240.1 acres (U. S. Census of Agriculture, 1964). Currently the selling trend is continuing and the average farm size is still increasing in size.

Between the U. S. Census periods of 1950 and 1960, the county population decreased 4.1 percent while the population of the state increased 15.7 percent (Table 5). The population of Mt. Carmel, the county seat, decreased 1.6 percent (Table 6) - thus indicating the loss of persons off the farm is not being absorbed by the smaller communities within the county. By the year 1980, it is predicted that the declining population will stabilize at approximately 15,000 persons (Peterson, 1967). In Wabash County, there is an estimated 65.6 persons per square mile as compared to the state population of 180.2 persons per square mile.

The county comprises an area of 214 square miles (141,440 acres). This is approximately one-half the average size of the surrounding counties (439 square miles average). Most of the county was originally in timber but now it occupies only a small portion of the county (9,560 acres) and is located primarily along the drainage systems.

The acres of water per capita is .35 acre or approximately 22 acres per square mile of land.

Water Resources

During 1962, an inventory of water was made by the Illinois Department of Conservation. The waters of Wabash County were all located and categorized as to size. Since that time records have been maintained of additional impoundments constructed through 1968 (Table 7). There are 449 lakes and ponds totalling 293 acres. There are 22 named and unnamed streams in the county; however, only two the Wabash River and Bonpas Creek are considered significant for this discussion (Table 4). These streams plus the impoundment acreage adds up to a grand total of 4,772 acres in Wabash County under water.

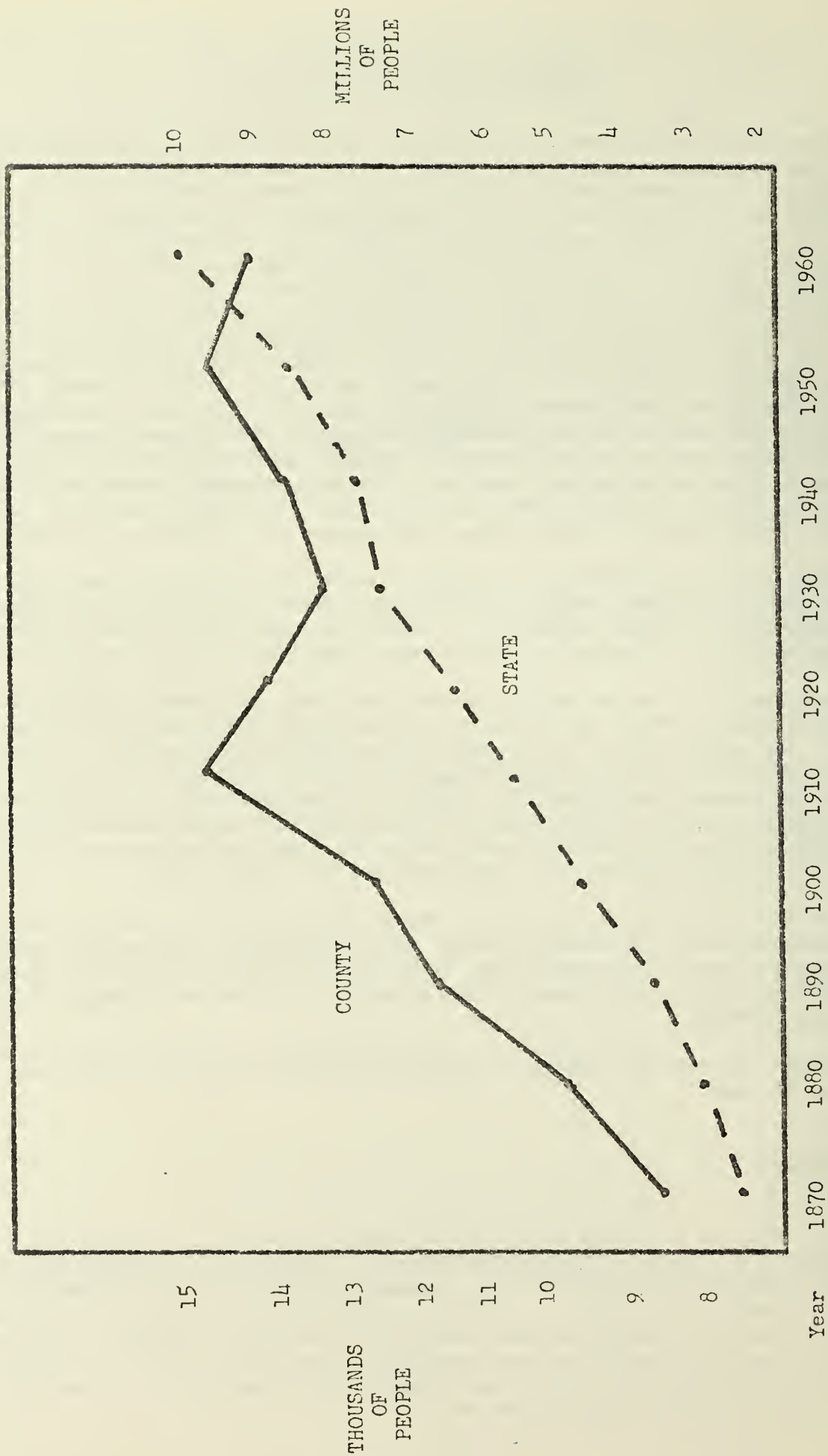


Figure 8 . POPULATION OF WABASH COUNTY COMPARED TO THE STATE OF ILLINOIS

Source of Data: STATE OF ILLINOIS DEPARTMENT OF PUBLIC HEALTH; BUREAU OF STATISTICS

TABLE 5

POPULATION AND AREA COMPARISON OF WABASH COUNTY TO THE STATE OF ILLINOIS

	Area Sq. Miles	Population (1960)	Percent Change (1950-1960)	Population Per Sq. Mile
Wabash County	214	14,047	- 4.1	65.6
State of Illinois	55,930	10,081,158	+15.7	180.2

TABLE 6

POPULATION AND PERCENT CHANGE BETWEEN 1950-1960 OF WABASH COUNTY
AND MT. CARMEL, ITS LARGEST CITY

	Population (1950)	Population (1960)	Percent Change (1950-1960)
Wabash County	14,651	14,047	- 4.1
Mt. Carmel	8,732	8,594	- 1.6

TABLE 7

WABASH COUNTY SURFACE WATER INVENTORY IMPOUNDMENTS

Size Categories		Artificial
Acres	Number	Total Acreage
0.1 to 0.4	367	84.84
0.5 to 0.9	41	24.80
1.0 to 5.9	39	75.15
6.0 to 10.9	1	6.90
101.0 to 500.9	<u>1</u>	<u>101.80</u>
TOTAL	449	293.49

Source of Data: Illinois Surface Water Inventory; Special Fisheries Report
Number One; 1964 (plus revisions through 1969); Illinois
Department of Conservation.

In Wabash County, there are two lakes classified as public or organizational over 6.0 acres in size, and total 102.8 surface acres. Most of the water areas in Wabash County are classified as farm ponds of less than one acre in size. Approximately 90 percent of the impounded water areas in Wabash County are in this category.

The most important lakes and streams for recreation include Wabash Valley Conservation Club, Mesa Lake, and the Mt. Carmel Golf Course Pond. All of these water areas are organizational and fishing is limited to the membership or guests. The major stream for recreation is the Wabash River which receives varied recreational and commercial uses. Bonpas Creek is used to a limited degree by local fishermen.

There are approximately 49 miles of the Wabash River and 32 miles of Bonpas Creek in the county. Other tributaries to these streams may provide limited fishing periodically; however, they are all intermittent in the summer months.

LAKE MORPHOMETRY AND ORIGIN

The majority of the lakes and ponds of Wabash County were constructed by placing an earthen fill across a valley. These impoundments vary in size from under 0.5 acre up to the larger impoundments of 101 acres (Mesa Lake). Except for a small percentage of dug livestock watering ponds, the ponds range from 10 to 20 feet in maximum depth.

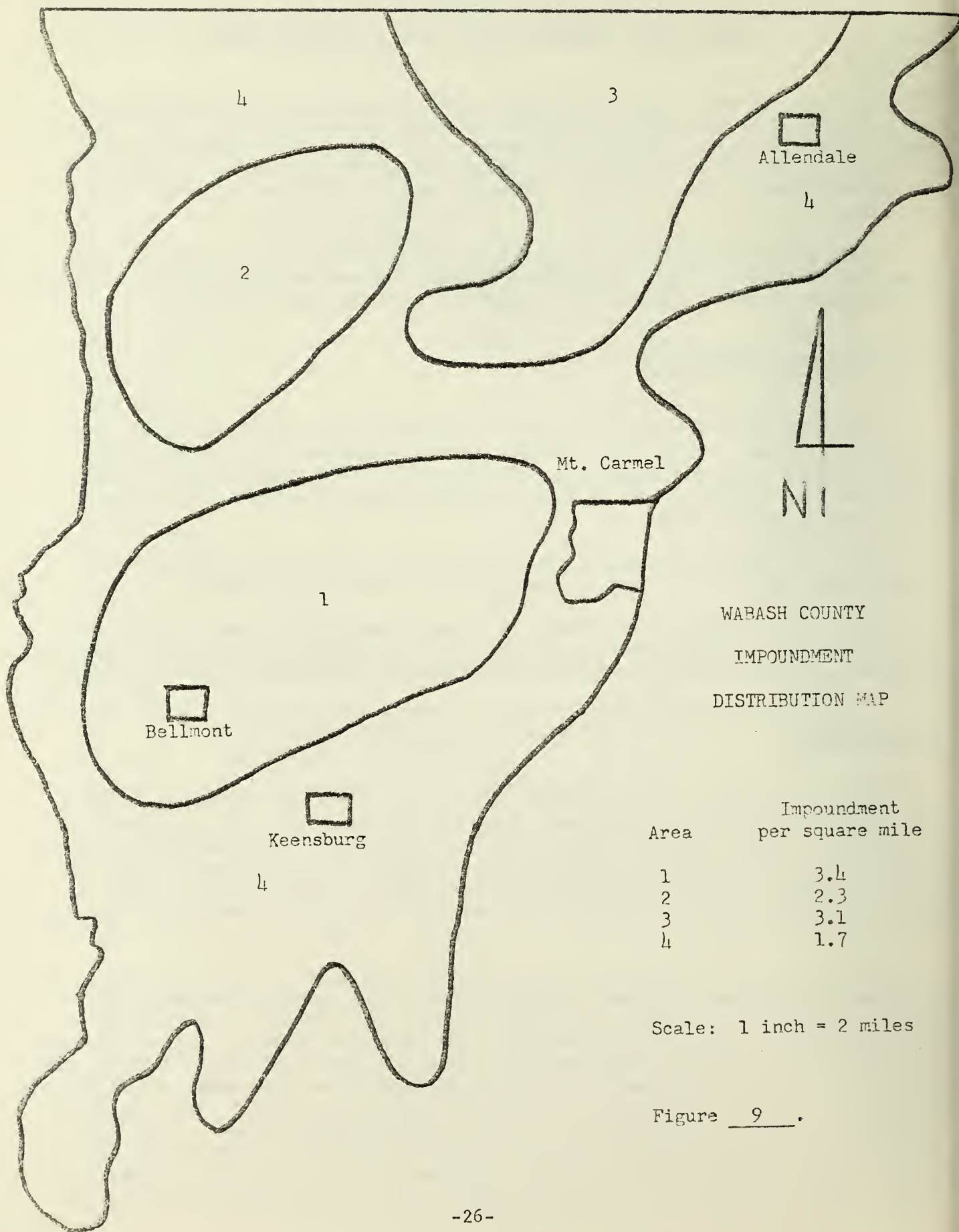
Most pond and lake construction is restricted to the hilly portion of the county where terrain permits more economical dam construction (Figure 9).

Most of the owners of farm ponds and lakes constructed in past years have received technical assistance from the U.S. Soil Conservation Service and financial assistance from the U.S. Agricultural Stabilization Conservation Service program.

WATER QUALITY

Most of the water areas in Wabash County are fertile and highly productive. The degree of fertility is dependent on the type of watershed the impoundment is located in. A large percent of the county is in cropland; lakes and pond receiving such drainage will accumulate added lime and phosphate fertilization. Lakes and ponds receiving additional enrichment from croplands and barnyards are higher in basic fertility which, in most cases, serves as a detriment (depending on the degree) to the receiving waters.

Fertility will cause a build up of aquatic plant life - filamentous algae (pond scum) sometimes completely covering ponds in the county. Enrichment of the water will increase the numbers of microscopic plants and animals in the pond called plankton. Underwater rooted plants may become so dense as to hinder various uses of the area as well as provide excessive escape cover for small sunfish. The uncontrolled build up of aquatic plants in waters will lead to summer and winter fish kills in the shallower ponds. At periods during the summer, various species of plankton become so abundant as to give the water a greenish cast. Many fish kills occur due to a plankton bloom and a sudden die-off. When the plankton, or any aquatic plant material, decomposes the oxidation of the dead material lowers dissolved oxygen concentrations below what fish require and they die of suffocation.



All of the deeper lakes and ponds of Wabash County are eutrophic - they contain no oxygen in the colder depths. Thermal stratification occurs in such areas about July and continues through September. During midsummer the water stratifies into three distinct layers; (1) epilimnion or upper layer of water, (2) the thermocline, middle layer, and (3) the hypolimnion or the lower layer of water. In some years, the surface conditions will not permit cold water fish (trout) survival in the county.

In general, the water areas, including streams, are alkaline with pH values occurring between 7.0 and 10.0.

FISHERIES

Fishing for sport is done in the organizational lakes: Mesa, the Wabash Conservation Club Lake, and the Mt. Carmel Golf Course Pond. Fishing for sport as well as commercial is undertaken on the Wabash River and to a less degree on Bonpas Creek in the area where it joins the Wabash.

The most important sport fish species are largemouth bass, bluegill and channel catfish (Figure 10).

The important commercial fishes which are fished both sport and commercially include carp, freshwater drum, channel catfish, flathead catfish, blue catfish, and bullhead catfish. Other commercial species generally not taken by sporting equipment include the buffalo, sturgeon, paddlefish, quillback carpsucker, and other sucker species. Few gar, bowfin, and eel are occasionally sold commercially.

Most of the commercial fishing in the county is associated with the Wabash River with commercial fishermen and fish markets located at Mt. Carmel and Grayville. Not all fishermen fishing commercial type gear, are termed commercial fishermen. A commercial fisherman is defined as one who sells fish, turtles, or mussels, as well as possessing so much commercial fishing equipment.

Years earlier a freshwater mussel industry did exist on the Wabash River. During the 1930's a button factory was located at Mt. Carmel and the Wabash and other streams in the area supplied the mussel shells for button cutting which died out with the invention of plastic buttons. Fewer years ago, the cultured pearl industry of Japan increased the demand for freshwater mussels.

WETLANDS

A few small marsh areas exist along the Wabash River. Most of the rich bottomland that may have once been marsh is in agricultural production. There are no large oxbow lakes along the Wabash River floodplain in this county.

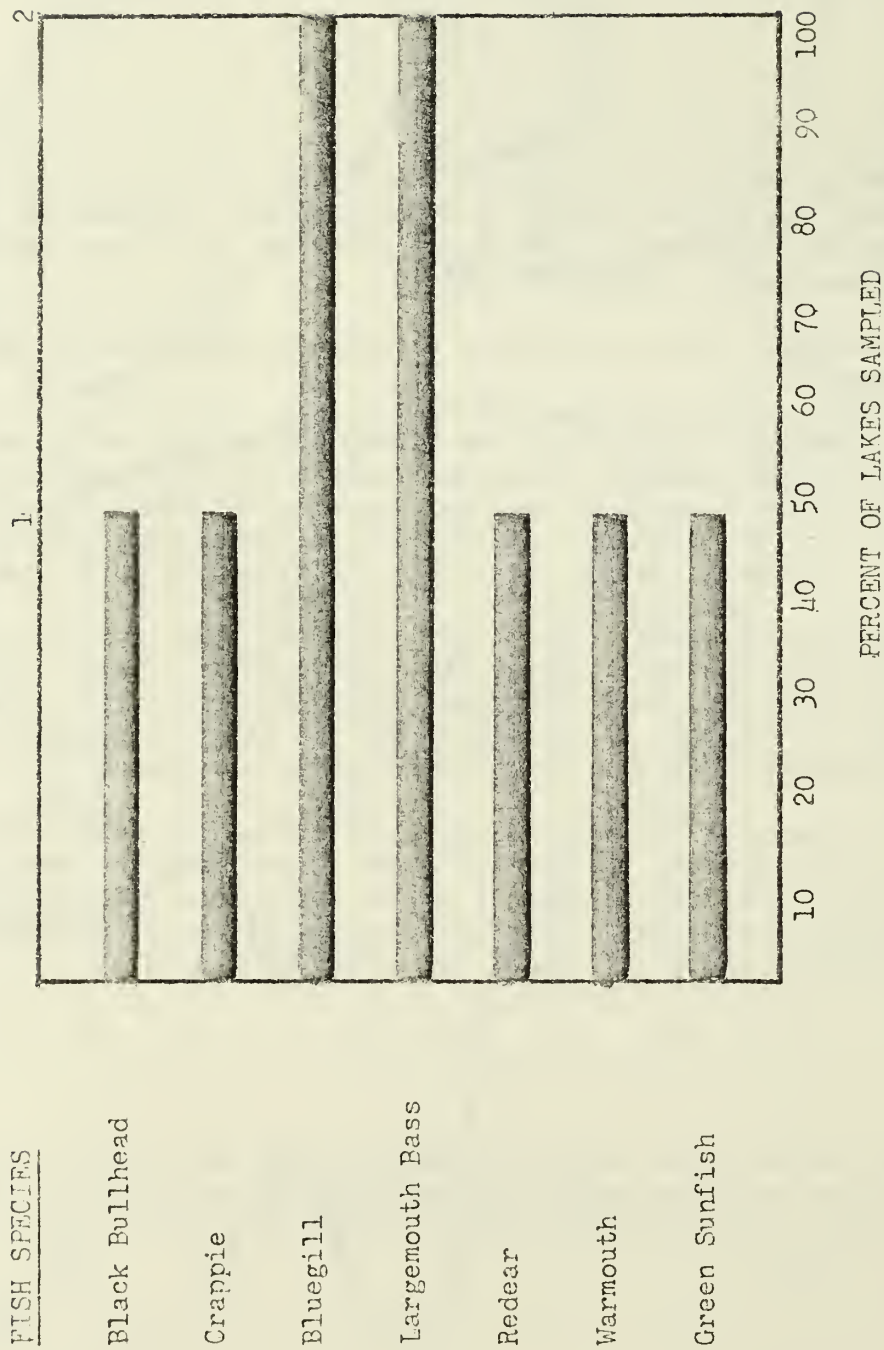


Figure 10 FREQUENCY OF OCCURRENCE OF FISHES IN WARASH COUNTY LAKES.
(2 lakes sampled)

Source of data: ILLINOIS DEPARTMENT OF CONSERVATION FILES.

PUBLIC USE AND ACCESS

Public use and access are restricted primarily to the Wabash River. The Mt. Carmel Boat Club maintains a launch ramp and picnic area which is open to members and persons boating in the area. A fee is charged to launch from the Mt. Carmel ramp.

If a person is interested in using a privately owned pond or lake, or a section of a stream, the right to trespass must be obtained from the property owner. Public access is available at stream bridges and along road right of ways.

Beall Woods, a 626 acre park owned by the Illinois Department of Conservation, exists near Keensburg. Basically this is a 600 acre virgin forest. It provides an excellent outdoor class room for tree identification. Trees are identified and trails are marked by the Illinois Division of Forestry. Approximately 20,000 persons a year visit this area.

Picnic tables, restrooms and shelters are available. There are no over night camping facilities.

COTTAGE AND HOMESITE DEVELOPMENT

Summer cottages and fewer permanent homes are built at Mesa Lake, near Lancaster. Several cabins exist along the Wabash River. Many such cabins are eye-sores to the rivers beauty. It would add to the aesthetic quality of this area if such dwellings could be screened from view.

PRESENT AND POTENTIAL USES OF SURFACE WATERS

Presently, the water orientated recreational activities in Wabash County are associated with hunting or fishing. Camping, boating, and swimming have only been undertaken when associated with these activities. As emphasis is placed on other forms of outdoor recreation, the potential that exists within the county must be understood.

Fishing

Fishing in Wabash County is done for both sport and commercial species. In recent years, the emphasis has switched to sport fishing due to the decline of the commercial industry.

Currently about one-tenth of the residents of Wabash County purchase a hook and line fishing license. The annual sale is approximately 1,200 licenses. During 10 years of records (1953-1963) sales varied having a peak of 1,600 in 1959 and falling to 1,300 in 1962 (Figure 11). The reduction to the current 1,200 licenses is consistent with a slump in licenses sales and is not completely understood. Possibly it can be associated with persons leaving the rural areas - urbanization.

There are approximately 325 licenses sold annually permitting the use of commercial fishing gear. Although commercial fishermen purchase a large number of these licenses, primarily for hoop net and basket traps, they do not represent all of the buyers. Other persons interested in catching commercial fishes may also fish commercial gear with the proper licenses. As of 1969 there were only 19 fishermen classified as commercial fishermen fishing the entire Wabash River bordering Illinois. The commercial fishermen's catch, for the entire river, for the last 17 year period was 1,336,144 pounds of fish. The number of commercial fishermen declined from 41 during 1953 to the current figure.

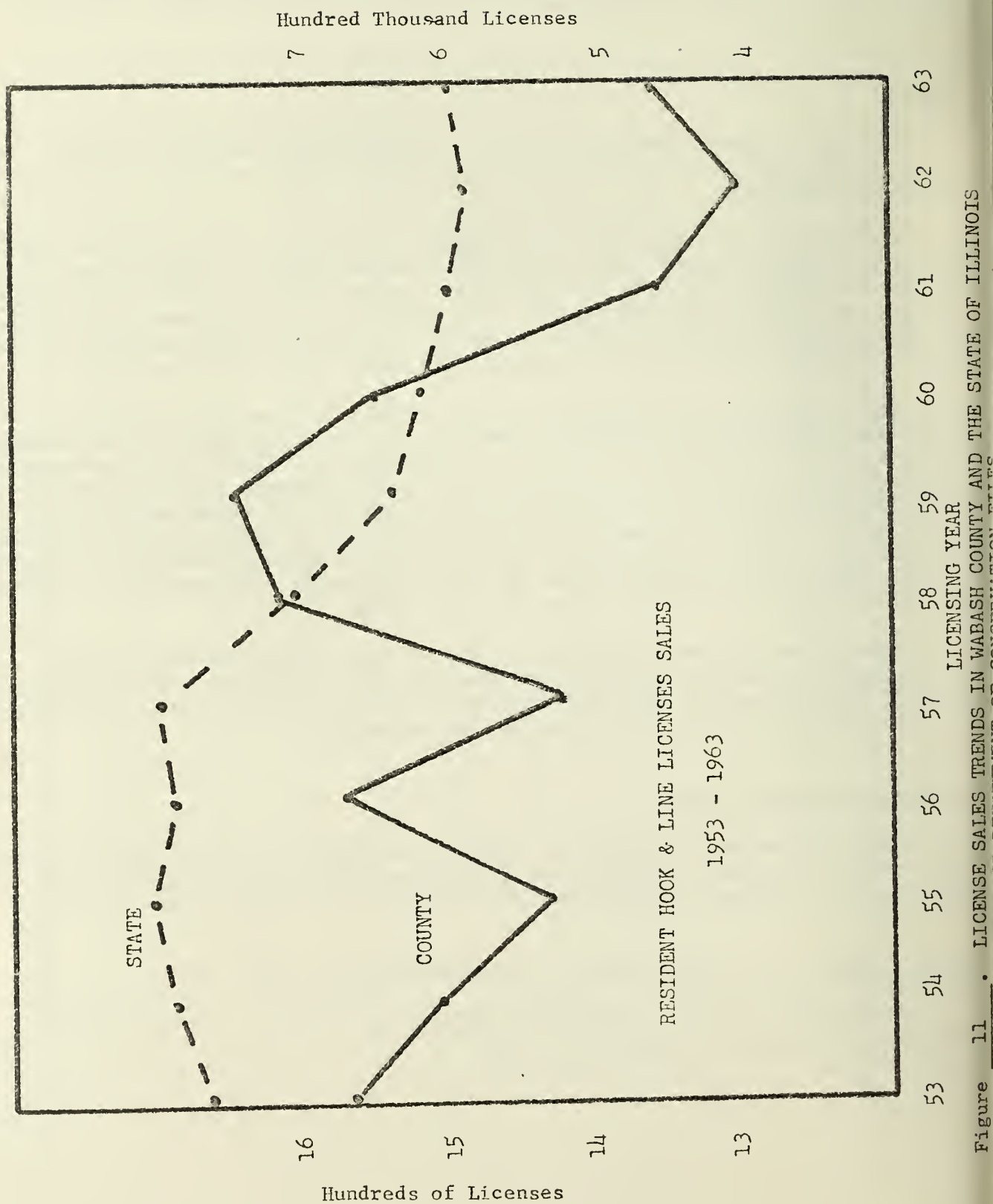
Fishing for freshwater mussels, by the bar and crowfoot method is also considered as commercial fishing. Records are not available for this capture method; however, during 1965 when 919 tons of mussels (valued close to \$240,000) were collected, this was the main method of collecting.

Potential Reservoir Sites

There are several locations for smaller impoundment, up to 10 acres in size, that could be developed for public or private use in Wabash County, but there is only one site that will impound over 50 surface acres of water (Figure 12).

Jordon Creek: T1N, R13W, Section 17; Estimated Surface Acres = 50.

This site has not been completely surveyed and little is known about the length of shoreline or depth of the lake.



POTENTIAL RESERVOIR SITE

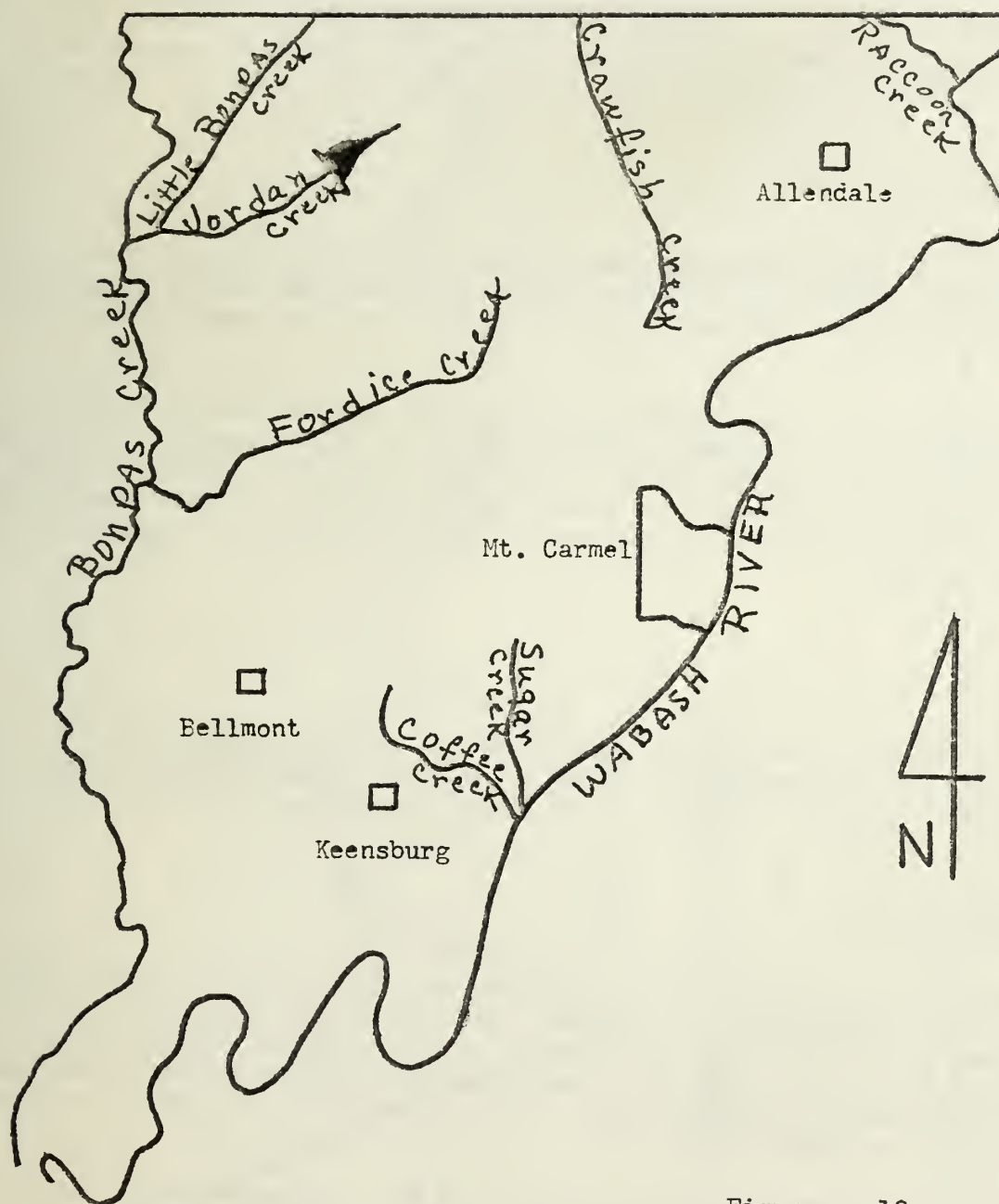


Figure 12

Boating

Wabash County does not have any lakes of adequate size to support unlimited power boating. Except for Mesa Lake, where regulated power boating is permitted, most of the boating is undertaken on the Wabash River.

Considerable boating, covering the water orientated recreational activities of canoeing, pleasure riding, water-skiing, fishing and hunting is undertaken on the Wabash River. There are 551 licenses issued to the boaters of this county.

Swimming

There are no public swimming beaches located in Wabash County. Some beaches are maintained by private water owners and some of the home owners at Mesa Lake. Such beaches are private and permission to use them must be obtained from the owner.

The sand bars of the Wabash River are used extensively for picnicking, sun bathing, and swimming. The danger of swimming in the river cannot be over emphasized. From one high water to the next there is a possibility of a channel or chute opening, thus making an area previously knee deep, over your head. Children should not be permitted to wade or play in the shallows of a sand bar until an experienced swimmer has checked the area.

Camping

There are no public or commercial camp areas located in Wabash County. Considerable camping is undertaken at various locations along the Wabash River. Persons who plan to camp along the Wabash should obtain permission from the property owners.

Hunting and Trapping

Between 1,500 and 1,600 persons purchase an annual license to hunt small game in Wabash County (Figure 13). Of primary interest to the hunters are rabbits, squirrel, and quail. The rural and physical aspects of the county meet the habitat requirements of these game species. For rabbit and quail, the small farm units with grown up fence rows are most desirable. Both red and gray squirrels are found in the wooded river bottoms.

Waterfowl hunting is limited to occasional wet seasons. When flooding of the Wabash River bottoms falls in conjunction with the migration season, hunting for the mallard ducks is exceptionally good.

Fox and coon hunting are also undertaken by a smaller group of country sportsmen.

HUNDRED THOUSAND LICENSES

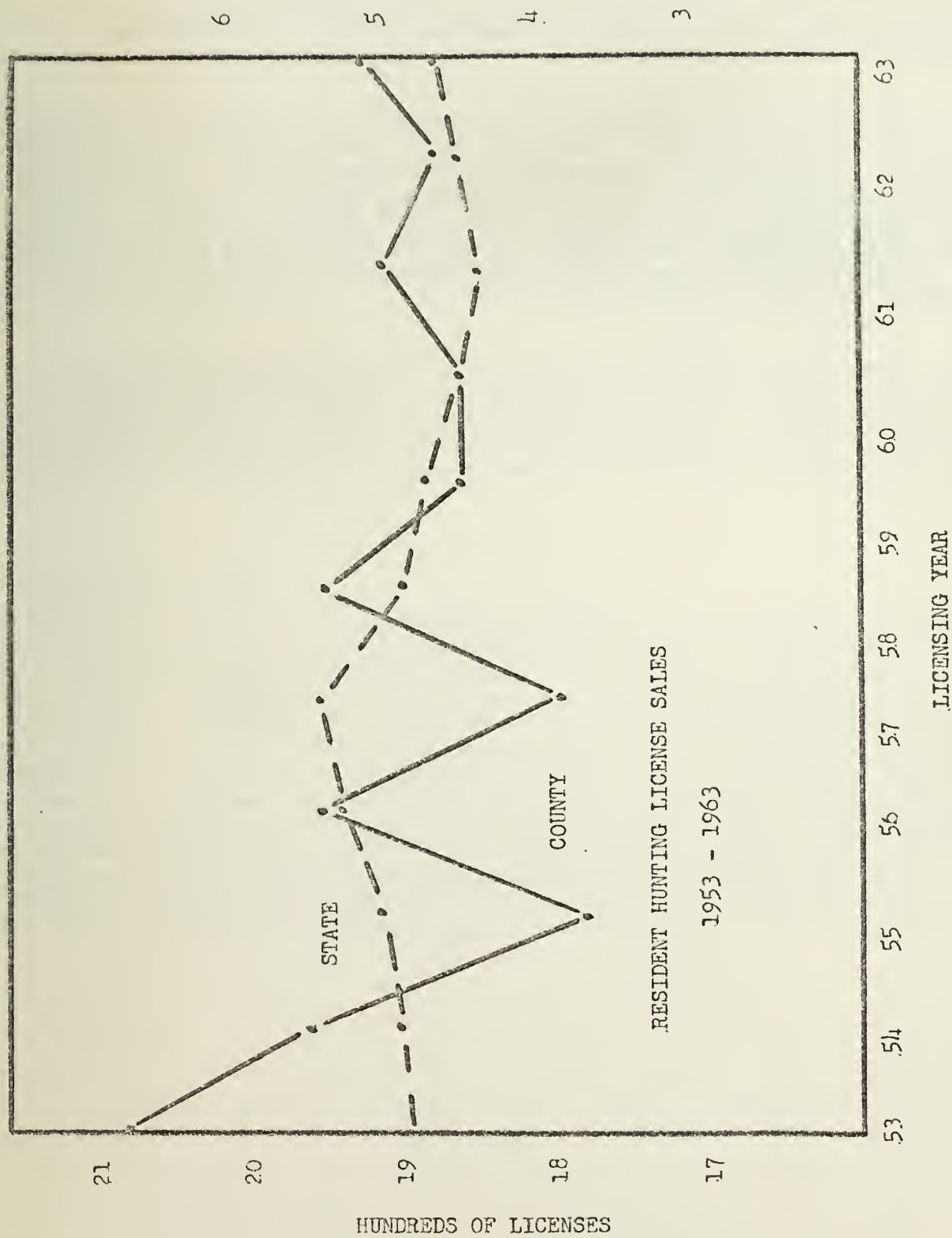


Figure 13 LICENSE SALES TRENDS IN WABASH COUNTY AND THE STATE OF ILLINOIS

Source of Data: ILLINOIS DEPARTMENT OF CONSERVATION FILES

The trapping of fur-bearing animals is undertaken for sport and does not contribute to the economics of the county. Animals such as muskrat, mink, and fox are sought by the trapper to supplement other income, but primarily affording recreation.

Aesthetics

Wabash County is an agricultural county attractive by standards applicable to a general farming landscape. Beauty of the farmscape runs the gamut from picturesque to ramshackled. The landscape varies from scenic in one area to an eyesore of rusted oil field equipment and saltwater damage in another. A rural road may have the potential of being a scene from a picture in a book - if one overlooks the refuse and trash people have deposited at bridges and in ditches. What is scenic in Wabash County depends upon where you look and how much you overlook.

SURFACE WATER PROBLEMS

Problems wrought by man have diversely affected all of the streams of Wabash County. No stream is untouched by siltation from cropland. Most of the streams have received oil and saltwater damage from the oil industry. An ever increasing threat to aquatic life is the increased use of pesticides, sewage effluents from homes, and agricultural operations.

Pollution

Oil pollution of the streams by oil sludge and saltwater has been damaging to the fish and wildlife of the area. The incidents of oil and salt pollution are decreasing because the field is old and as the wells become less economical to operate they are taken out of production. However, one may still find oil sludge along the stream banks that is harmful to wildlife and destroys the aesthetic value of the stream.

Pollution-caused fish kills in private ponds and lakes from barnyard or feed-lot operations are common problems. An increasing problem is pollution by pesticides which are highly toxic to aquatic life and perhaps even man. The increased fertilization of waters by both organic and inorganic fertilizers, effected by man, will require serious consideration to maintain water quality standards that will support life.

Fluctuating Water Levels

Wabash County has two types of drainage areas; the uplands where the streams are small and intermittent and the bottomland areas of the Wabash River and Bonpas Creek. Occasional flooding creates problems for the farmers in the uplands. It is in this area the detrimental cycle of many flood control proposals arise. Farmers in the uplands of the minor drainages within the county and the major drainages out of the county in both Illinois and Indiana appeal to governmental agencies for assistance in the form of channel improvement. Locally the channel improvement does what it is supposed to; it shortens the duration of flood by getting the water off the crops and cropland faster. This creates problems in the lower watershed which in turn instigates more flood control proposals. Possibly an alternate approach involving more desired flood plain management practices other than channelization would be more beneficial. We must insure the total and proper use of our non-replaceable and delicate lands.

THE FUTURE

Wabash County will remain predominantly an agricultural county. A farming community is busy producing during the recreational season and leisure time is nonexistent. It is obvious that if everyone were interested in outdoor recreation present resources would not begin to fill the need. As the amount of leisure time and the number of people increase in Wabash County, the need for additional outdoor recreational facilities will become more important.

Wabash County is above average in potential for meeting the future recreational needs. The county has adequate natural land and potentially scenic areas to meet outdoor recreational requirements.

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OTHER SOURCES OF INFORMATION

Illinois Natural History Survey (Records of Fish Collections).

Soil Conservation Service, U. S. Department of Agriculture.

Agricultural Stabilization and Conservation Service, U. S. Department of Agriculture.

Illinois Department of Conservation Files.

Personal Interviews.

GLOSSARY

ACRE FOOT - An area of one acre covered to a depth of one foot. One acre foot is 43,560 cubic feet or 325,851 gallons of water.

AESTHETICS - The overall scenic attraction of a lake setting; natural beauty of shore and waters, or any unusual natural phenomena; the appeal of its wildlife and aquatic plants.

ALGAE BLOOM - A bloom of algae (microscopic plants) may be so dense that it imparts a greenish, yellowish or brownish color to the water.

ALKALINITY - Ordinarily expressed as a pH above 7. Most water in the alkaline class has a range from pH 7.6 to 10.0. Alkalinity may be expressed as the amounts of carbonates, bicarbonates, and hydroxides present in the water.

ALLUVIUM - The sediments, or detrital matter, carried by inflowing streams and deposited on lake bottoms.

ANTICLINE - An arch of stratified rock in which layers bend downward in opposite directions from the crest.

AQUATIC PLANTS - Plants whose seeds germinate in the water or in the lake bottom soil; those that grow in water and are commonly grouped as floating, submersed and emersed.

AQUIFER - Any geological formation containing water, especially one which supplies the water for wells and springs.

ARTIFICIAL IMPOUNDMENT - Basins purposely excavated by man and filled with water by catchment from runoff, by pumping or by diversion of natural water bodies.

BASE FLOW - Flow in a stream when no runoff or precipitation is taking place.

BOD - The abbreviation for biochemical oxygen demand which is a measure of the amount of water soluble oxygen required by microscopic organisms to decompose a given amount of organic material in a specific amount of time.

COD - Abbreviation for chemical oxygen demand which is a measure of the chemically oxidizable organic matter in a given sample of water. The ratio between the BOD and COD is an indication of the relative proportion of biologically available organic matter in a given sample.

CARRYING CAPACITY - The maximum number (or weight) of organisms of a given species and quality which can survive in a given ecosystem through the least favorable environmental conditions that occur within a stated interval of time.

COMMERCIAL FISH - Fish that are caught by special tackle and sold.

CREEL CENSUS - Information obtained from anglers on their fishing success. A creel census can give information on fishing pressure, fishing quality, the total number and weight of fish being harvested, and the kind and size of fish being caught.

DERELICT LANDS - Those quarries, gravel pits and strip mines which have been abandoned or are depleted.

DO - An abbreviation for dissolved oxygen which is oxygen available in water for the survival of fish and other organisms.

DRAINAGE BASIN OR AREA - That part of a land area over which runoff water drains to a common point. See WATERSHED.

ECOLOGICAL - Pertaining to the interrelationship of living things and their environment.

ECOSYSTEM - A community of organisms, interacting with one another, plus the environment in which they live and with which they also interact; e. g. a pond, lake, or stream.

EPHEMERAL - Lasting a very short time; short-lived; as applied to water areas - short-lived lakes and ponds.

EPILIMNION - In a thermally stratified lake, the turbulent layer of water that extends from the surface to the thermocline.

ESKER - A serpentine ridge of gravelly and sandy drift, believed to have been formed by streams under or in glacial ice.

EUTROPHICATION - Enrichment of the water or lake soil. Increase in nutrients required for growth of organisms may come about by natural processes or rapid enrichment may take place due to some cause such as the introduction of sewage effluent. Eutrophic lakes are well provided with basic nutrients.

EVAPOTRANSPIRATION - The combined losses from a lake surface due to evaporation, sublimation and transpiration from plant life.

FLATS - Water with slight to moderate current and with an unbroken surface but less depth than pools.

FLOODPLAIN - That part of a lake or stream basin lying between the shoreline and the shore cliff and subject to submergence during a high water stage.

FLUVIAL - Pertaining to streams and rivers.

FORAGE FISH - All small size fish used as food by larger fish.

GLACIAL DRIFT - Material of any sort deposited in one place by glacial action after having been moved from another location.

GLACIAL LAKE - A lake formed as a result of glacial action.

GLACIAL OUTWASH - Deposits made of materials produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting glacial ice. The deposits now exist as stratified beds of clay, sand or gravel in the form of plains, valley trains and deltas of old glacial lakes.

GLACIAL PLAINS - Glacial material that has been sorted or stratified by the melt-water of a glacier and is carried and deposited mainly as beds of clay, sand or gravel to form plains.

GLACIAL TILL - A deposit of unstratified earth, sand, gravel and boulders transported by glaciers.

GOB-PILE - The refuse area from a coal processing plant consisting of waste coal by-products, rock material and soil.

GRADIENT - The inclination from the horizontal of the lake bottom beginning at the shoreline. The slope of a stream over a given distance.

GRAVEL PIT - Lakes or ponds formed by the excavation of gravel.

GROUND WATER TABLE - The upper limit of the part of the soil or underlying material wholly saturated with water.

HARDNESS (Water) - That quality in water which is imparted by the presence of dissolved salts, especially calcium sulfate or bicarbonate.

HOMOGENOUS - Composed of parts all of the same kind.

HYPOLIMNION - In a thermally stratified lake, the layer of water below the thermocline and extending to the bottom of the lake. The water temperature is virtually uniform.

IMPOUNDMENT - A body of water ponded or held back by a dam, dike, floodgate or any other barrier.

INTERMITTENT STREAM - A stream having water only part of the time.

KAME - A more or less rounded hill of sand and gravel associated with glacial deposits.

LACUSTRINE DEPOSIT - Materials deposited from lake water.

LAKE - A large body of water surrounded by land. The Illinois Department of Conservation classifies all impoundments six acres or larger as lakes.

LITTORAL ZONE - A narrow zone including both land and water immediately bordering the shoreline of a water area.

LOAM - A rich friable soil containing a relatively equal mixture of sand and silt and a somewhat smaller portion of clay.

LOESS - An unstratified deposit of yellowish-brown loam covering areas in North America, Europe, and Asia, now generally thought to be chiefly a wind-borne deposit.

MARSH - An area where water stands the year-round and is usually abounding in water weeds, cattail, bulrushes and other emersed vegetation.

MGD - An abbreviation for million gallons per day.

MORaine - A ridge, mound, or irregular mass of boulders, gravel, sand and clay deposited by a glacier.

MORPHOMETRY - Measurements such as depth, length, width, volume, shoreline and bottom gradients of a water area.

- NATURAL LAKE - Any large impounded water area not formed by an act of man.
- NURSERY STREAM - A tributary stream used by small fish for protection and feeding until they reach maturity.
- OXBOW LAKE - A lake occupying the abandoned channel of a looping meander of a river.
- PARAMETER - A constant or variable term in a function that determines the specific form of the function but not its general nature.
- PERMEABLE SOILS - Soils capable of allowing the passage of water. A porous soil.
- pH - The symbol for the logarithm of the reciprocal of hydrogen ion concentration in gram atoms per liter. A pH of less than 7.0 is acid, a pH of 7 neutral and more than 7.0 is alkaline. pH indicates the acidity or alkalinity of a material.
- PHOTOSYNTHESIS - The process by which green plants use sunlight, carbon dioxide and water to produce carbohydrates and oxygen.
- PHYSIOGRAPHY - The science of physical geography. A study of the features and nature of the earth surface.
- PLANKTON - A term for an assemblage of micro-organisms, both plant and animal, which float, drift or swim in the water and in their movements are subject to wave and current action.
- POLLUTION - The presence of any foreign substance in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness of the water.
- POND - A small body of water surrounded by land. The Illinois Department of Conservation classifies all impoundments less than six surface acres as ponds.
- POOLS - Deeper portions of a stream, usually with a smooth surface and slow flow.
- PPM - Abbreviation for parts per million in terms of unit of weight. Used to report the availability or presence of salts, nutrients, gases and toxic materials in water.
- PRIMARY PRODUCTIVITY - The rate at which energy is stored by photosynthetic and chemo-synthetic activity of producer organisms (green plants) in the form of organic substances which can be used as food materials.
- REHABILITATION - To restore to a good condition. In the case of undesirable fish populations, the population is removed in whole or part in order to restore it to a good condition.
- RELIEF - A contour variation of the land surface in relation to the surrounding land.
- RIFFLES - Shallow but rapid current over gravel or rubble.

ROTENONE - A plant alkaloid and is the active ingredient in Derris powder, Cube, Barbosco, Akar Tuba and also in the currently available fish toxicants for use in killing fish.

RUNS - Moderate to rapid current flowing in a deeper narrower channel than a riffle but the current is not as turbulent as in a rapid.

SECCHI DISC - A circular plate 20 centimeters in diameter, the upper surface of which is divided into four equal quadrants and so pointed that two quadrants directly opposite each other are black and the intervening ones white. The instrument is used to measure light penetration in water.

SILTATION - The filling of water areas by sediments carried in by inflowing surface water.

SPORT FISH - Any fish that is sought after by anglers using a pole and line.

STRATIGRAPHY - A branch of geology dealing with the classification, nomenclature, correlation and interpretation of stratified rocks.

STRIPMINE LAKE OR POND - Water impoundments resulting from coal mining operations near the surface of the ground.

SUBSTRATE - The bottoms deposits of a lake or stream on which organisms may grow.

SYNCLINE - Sloping downward in opposite directions so as to meet in a common point or line. A downward fold or rock strata.

TAILWATER - The portion of a stream immediately below a dam.

TERMINAL MORaine - A ridge of glacial till marking the farthest advance of a particular glacier.

THERMAL STRATIFICATION - Differences in water temperature from the surface to the bottom in which distinct layers caused by temperature gradients and resulting changes in water density.

THERMOCLINE - The stratum of water in which there is a rapid rate of decrease in temperature with depth; a minimum of one degree Centigrade per meter of depth. The thermocline is located immediately below the epilimnion.

TOPOGRAPHY - The detailed mapping or charting of the features of a relatively small area, district or locality. The relief features or surface configuration of an area.

TURBIDITY - The degree of opaqueness of water due to the amount of fine matter in suspension.

WATERSHED - The whole surface drainage area that contributes water to a stream or impoundment.

WETLANDS - Land features that are permanently wet or intermittently water covered such as swamps, marshes, bogs, muskegs, potholes, swales, glades, slashes, and overflow land of river valleys.

WINTERKILL - Partial or complete loss of fish and animal life of a water area due to the formation of a complete ice cover causing oxygen depletion from water stagnation.

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